THE WELDING ENGINEER

JULY, 1951 35¢

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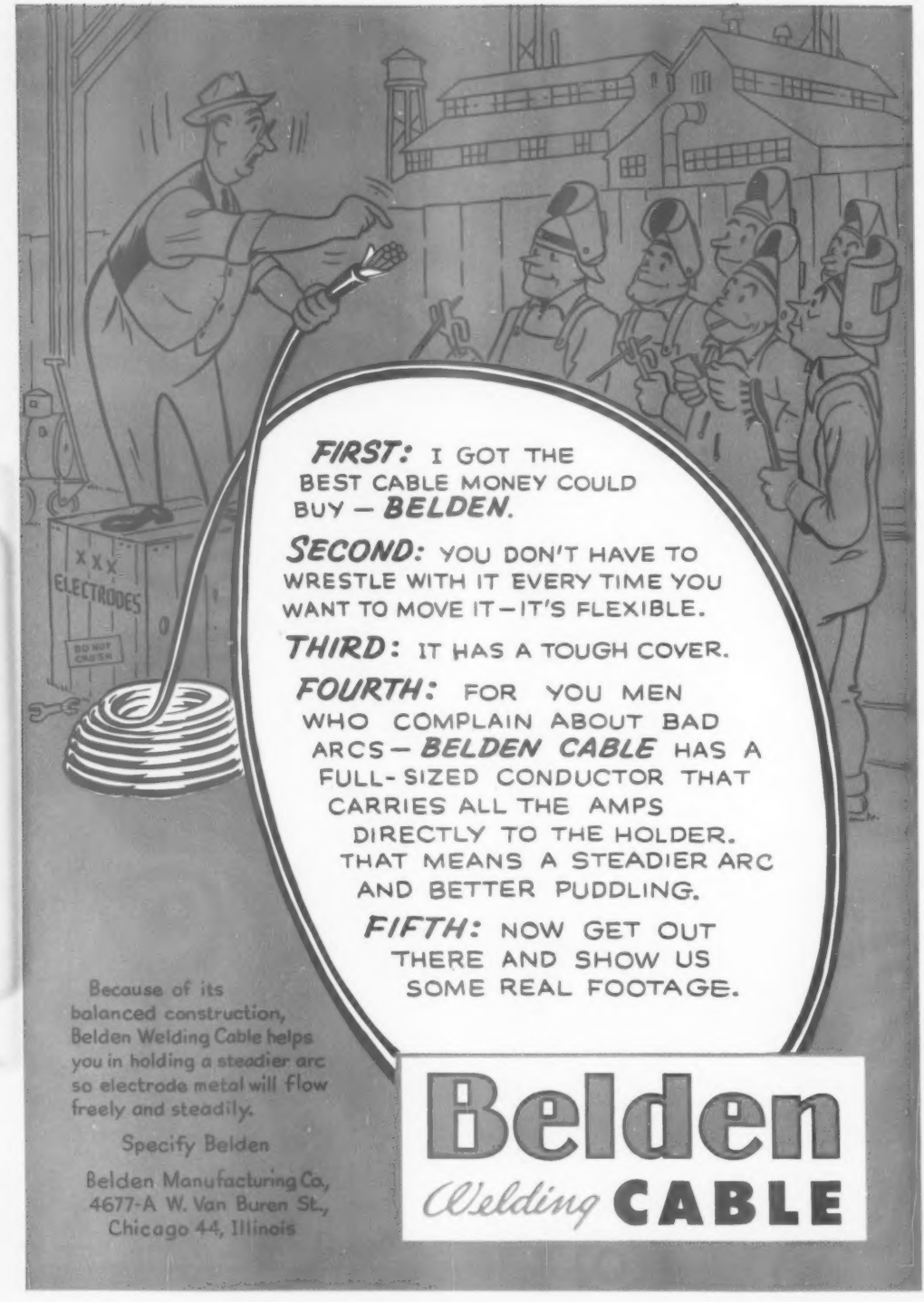
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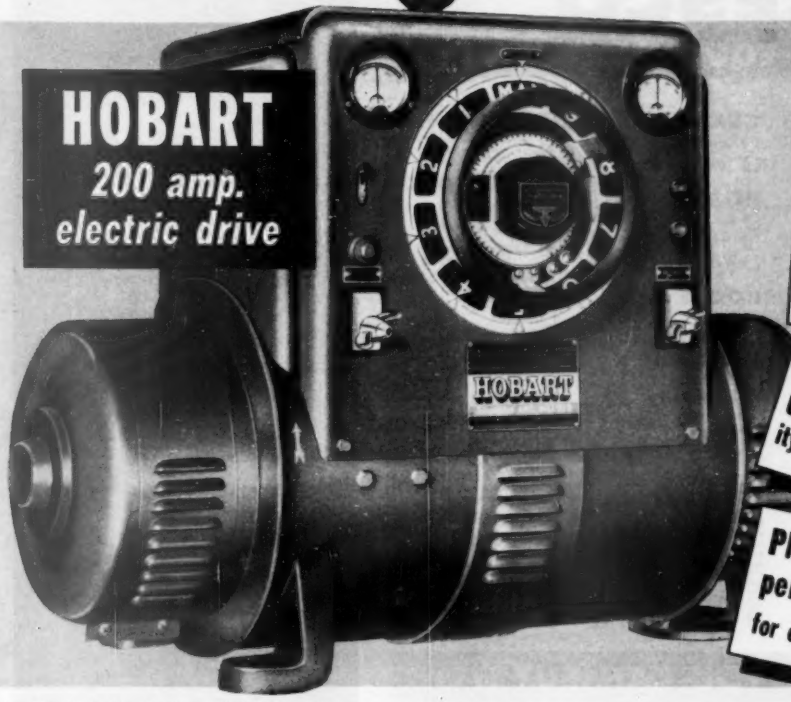

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Easier Welding Unusual arc stability, separate exciter

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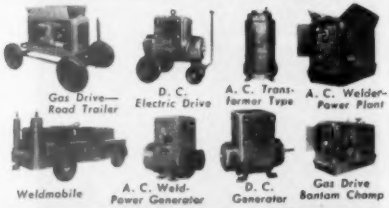

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On light work or heavy, overhead or downhand—there's a HOBART electrode made to give you better results whether you are using A. C. or D. C. welders. Easier to use. Less spatter. Check coupon for catalog listing full range of sizes and types.

HOBART performance gets the PROFITS

If you think "beauty is only skin deep," you should see the *inner workings* of the Hobart Multi-Range Arc Welder laid out alongside others. You'll find that Hobart's "good looks" are only the natural result of extreme care in designing functionally from the inside out.

Compare Hobart all the way through—note the husky, rugged construction of motor and generator—the ingenious use of copper and steel to add CONVENIENCE of operation to increase the operator's productivity. You'll know WHY you can expect higher quality welds made faster and more easily, and why you don't have to worry about lost time or maintenance expense.

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HOBART BROTHERS CO., Box U-71, Troy, Ohio

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JACKSON
GROUND CLAMP
No. 2/0

GROUNDWORK

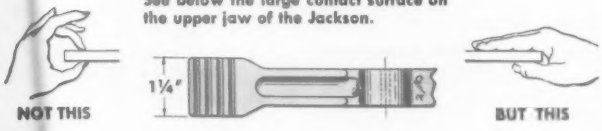
for Profitable Welding

Arc Welders must put on the heat. But only at one point: at the end of the electrode. And any heat elsewhere along the welding circuit means current wasted.

Don't rely on makeshift ground connections, inefficient and unwieldy C-clamps and plates, and on hastily made cable splices, ineffective and unstable.

Wherever connections must be made in the circuit, choose Jackson cable fittings which provide ample metal-to-metal contact to ease the flow, and stop the loss of current.

For greater metal-to-metal contact in a ground clamp, which would you choose? See below the large contact surface on the upper jaw of the Jackson.



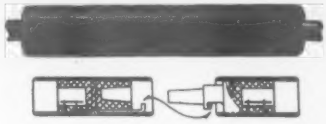
JACKSON GROUND CLAMPS

When choosing between ground clamps, take a close look at the Jackson, and note the large, flat contact surface of the copper alloy upper tong. It provides the greatest and surest conductivity between the clamp and the work.

Other features: Simple, rugged design: the upper tong for contact, the lower for pinch. Greater leverage at the "handle" end of the tongs; they go easier *on*, easier *off*.

Recent improvements: New music wire coil spring . . . complete spring insulation at both ends against accidental arcing, and to prolong spring life . . . new, larger pivot bolt for greater strength, where it counts most.

Double Economy: The Jackson Ground Clamp, eliminating loss of valuable welding current, will pay for itself in very little time. And because its price is low, you may be sure of *double economy* when you buy Jackson's.

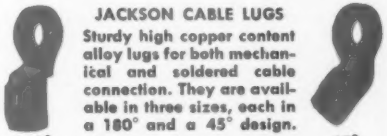


JACKSON "QUIK-TRIK" CABLE CONNECTORS

The safest way of making cable extensions. By connecting the female unit to the cable lead, the live cable end is always well insulated when not in use. Units lock tight by a twist of the hand. To avoid delays in your shop, keep your stock of replacement holders on hand with a length of cable and a male unit of the cable connector fastened to them. Then, if a holder needs replacing, get a spare and connect it in a minute.

JACKSON CABLE SPLICERS

Cable ends make adequate metal-to-metal contact with the copper alloy splicer, clamped, soldered, or brazed. For permanent, well insulated extensions; time saving, economical.



JACKSON CABLE LUGS

Sturdy high copper content alloy lugs for both mechanical and soldered cable connection. They are available in three sizes, each in a 180° and a 45° design.

Please specify type required

See your Jackson Distributor for prompt delivery
Also ask him about Jackson Electrode Holders, Eyeshields, and Safety Goggles

JACKSON
PRODUCTS
WARREN · MICHIGAN

MODEL	CABLE SIZE	CABLE CONNECTION	CAPACITY	GROUND CLAMP jaw opening	GROUND CLAMP price	CONNECTOR price	SPLICER price	LUG price
No. 1	4 thru 1/0	mechanical or soldered	300 amp	1¼"	2.75	2.95	1.60	.80
No. 2/0	1/0 and 2/0	mechanical or soldered	500 amp	1¾"	3.50	3.75	1.85	.90
No. 4/0	3/0 and 4/0	soldered only	500 amp	1¾"	3.25	3.50	1.50	.80

NEWS FROM WASHINGTON

NPA Welding Equipment Section Is Enlarged

APPOINTMENT of Preston M. Hall and Harold R. Smith to the Welding Equipment Section, General Industrial Equipment Division, NPA, was announced on June 12 by Dale D. Spoor, chief of the section.

"Pete" Hall, who is from Warren, O., is well known in the resistance-welding field. He has had his own business in Worcester, Mass., and later in Warren in the design and manufacture of spot welders. In 1946 and 1947, he was with the Resistance Welders Manufacturers Association, writing and reporting on new developments in the resistance-welding industry. During World War II he was with the War Production Board in Washington, taking care of resistance-welding problems. This experience should prove very valuable to NPA.

Harold R. Smith should be another name and face familiar to the welding industry "Smitty" was also with the War Production Board during World War II, and served from 1942 to 1945 in the Welding Equipment Section. After the war, he worked with the War Assets Administration in Washington, handling surplus materials. He has returned to help maintain production in the welding industry, and is handling all of the Controlled Materials Plan applications.

PRESTON HALL ("Pete") has just been appointed in charge of resistance welding for Welding Equipment Section, NPA

HAROLD R. SMITH ("Smitty") is working again in the Welding Equipment Section, NPA. He processes all CMP applications

Full-Alloy Steels "Set-Asides" Increased

PRODUCERS of full-alloy steel products have been directed to set aside sharply increased percentage reserves in the third quarter for defense-rated orders under CMP, using a new basis for calculations.

Each producer must now figure his new set-asides on the basis of his currently planned production for the third quarter. The previous base period was the first eight months of 1950. This change of base period alone may double the amount of full-alloy steels available for defense-rated orders.

Here Is Your New Defense Alphabet

FOR YOUR convenience, here are some of the more common abbreviations of the names of defense agencies and programs that you will be seeing from month to month in "News From Washington":

NPA—National Production Authority.

DPA – Defense Production Authority.

OPS—Office of Price Stabilization.

WSB—Wage Stabilization Board.

ESA—Economic Stabilization Agency.

ODM—Office of Defense Mobilization.

CMP – Controlled Materials Plan.

MRO—Maintenance, Repair and Operating (supplies).

CPR—Ceiling Price Regulation.

GCPR – General Ceiling Price Regulation.

IAC—Industry Advisory Committee.

Welding Manufacturers Apply for CMP Metals

A VERY high percentage of eligible welding equipment manufacturers have filed CMP-4B applications for the third quarter under the Controlled Materials Plan. Applications covering about 90% of the welding equipment supply had been received before the deadline. This is in sharp contrast to the overall metalworking industry, where applications have lagged behind schedule.

Those who did not file will not receive any allocations of CMP metals, and they will have to seek materials from the "free" supply. Many observers predict that 100% allocation will have to be introduced by the end of 1951, and that the "open-end" basis of CMP may not last beyond the third quarter. So, to guard against being left out in the cold, be sure to file your application for the fourth quarter if you missed out in the third.

NPA Chief Manly Fleishmann has announced that allocations for CMP metals will be mailed to those who filed quota applications in time to place orders for September. He also warned that quotas were

NEWS FROM WASHINGTON (Continued from page 5)

a mandatory limitation on metal use for the July-September period.

NPA Eases CMP for Small Producers

MANUFACTURERS of many products on the CMP Class B Products List will not have to file an application form CMP-4B. This exemption applies to you if you manufacture products not marked by an asterisk on the Class B Products list and if your requirements for steel, copper and aluminum are less than the following: 5 tons of carbon steel (including wrought iron); ½ tons of alloy steel (except stainless steel); 500 lb of copper and copper-base alloy foundry products and powder; and 500 lb of aluminum.

Any producer who is not required to file form CMP-4B by virtue of this ruling (Direction 1 to CMP Regulation 1) is authorized to use the allotment symbol SU on delivery orders for these controlled materials.

"Set-Asides" Increased for Copper and Alloys

PRODUCERS of copper, brass and copper-base alloys have been advised by NPA to set aside up to 75% of their average monthly production of these metals in the first quarter of 1951 for July. They were told that defense requirements probably would not take more than 35% to 40% of their total copper and brass production.

Increases Granted in MRO Allowances

A 20% INCREASE in MRO supplies, bringing up to 120% the supplies permitted to DO-97 users, has been announced by NPA. At the same time, according to the new rules, users may choose as their base period either the calendar year 1950 or the nearest fiscal year ending before March 1, 1951. Furthermore, those who use 20% or less of their quota under DO-97 can now buy an unlimited amount from outside sources without having any of it counted against their quota.

The 20% increase was intended to compensate for an estimated 10% increase in MRO supply costs, plus plant expansion and stepped-up production since the original base period. The change in base period should result in a further increase to many operators.

It is expected that these liberalizing provisions will encourage more widespread use of DO 97's. This permits distributors to replenish their stocks of MRO materials, and manufacturers will, in turn, be able to get the raw materials for these products.

Auto Production Restricted by M-68

PASSENGER car production for the third quarter of 1951 will be held to about 1,200,000 units. NPA's Order M-68, restricting the supply of steel, copper and aluminum to the auto industry, will result in what amounts to a 37% cut from the same quarter production in 1950. Production during the second quarter is said to have been about 1,400,000 cars, with a total production for 1951 estimated at 5,400,000, as against 6,500,000 for last year.

Steel Allowance for Consumer Durables Cut

NPA HAS ORDERED a reduction in steel to producers of consumer durable goods during the third quarter to 30% of pre-Korean levels. This order was contained in Amendment 1 to M-45, governing the use of scarce metals in consumer durables other than passenger cars. It compares with the 20% cutback that was imposed against the production of such articles during the second quarter.

The regulation did, however, make a concession to producers in allowing them to use either the first half of 1950 or the last six months of 1949 as a base period on which to calculate their consumption of steel.

Small Business Guide Offered Free

A QUICK SOURCE of government services to the small businessman is offered in "Mobilization Guide for Small Business," a 31-page pamphlet recently issued by DPA.

Included in the guidebook is such information as: How to be placed on Government bid lists; methods of financing plant construction; how to apply for "hardship" relief from controls and regulations; and means of getting help in obtaining needed machinery and operating supplies.

Copies of the booklet are available, without cost, at all field offices of the Department of Commerce or from the Commerce Department, Washington, D.C.

NPA Allotments for Foreign Well Drilling

NPA HAS authorized petroleum operators to order oil-country tubular steel goods for drilling oil and gas wells in 20 foreign countries. Operators can use priority rating DO-48C in placing such orders after July 1st.

Tonnages distributed for July shipment are part of the 40,000 tons of such goods authorized by NPA for foreign petroleum operations during the third quarter of 1951. In addition, NPA has allotted 13,000 tons of oil-country tubular goods for drilling oil and gas wells in Canada.

Revised List of Critical Jobs Longer

THE LIST of critical occupations to be used by the Defense Department and by Draft Boards in determining whether a reservist or a draftee should be deferred has been revised and released by the Labor Department. Copies are available on request. Four new jobs have been added to the list, now totalling 58, of those who can get deferments from military service.

this, too, is an important end . . . . . .
this is the finest needle valve any torch has the good fortune to call its own — NO FLICKER — NO STEM LEAK — NO LOOSENESS.

Everybody who has used a welding or cutting torch knows what trouble poor needle valves can cause; every operator appreciates that the needle valve is the final flame control.

Here, then, are needle valves which work all of the time. Special metal reinforced packing, under multi-directional tension, keeps a gastight joint and firmly guides and holds the stem to prevent looseness. Before you buy your next torch, test for yourself the many advantages NATIONAL can offer you.

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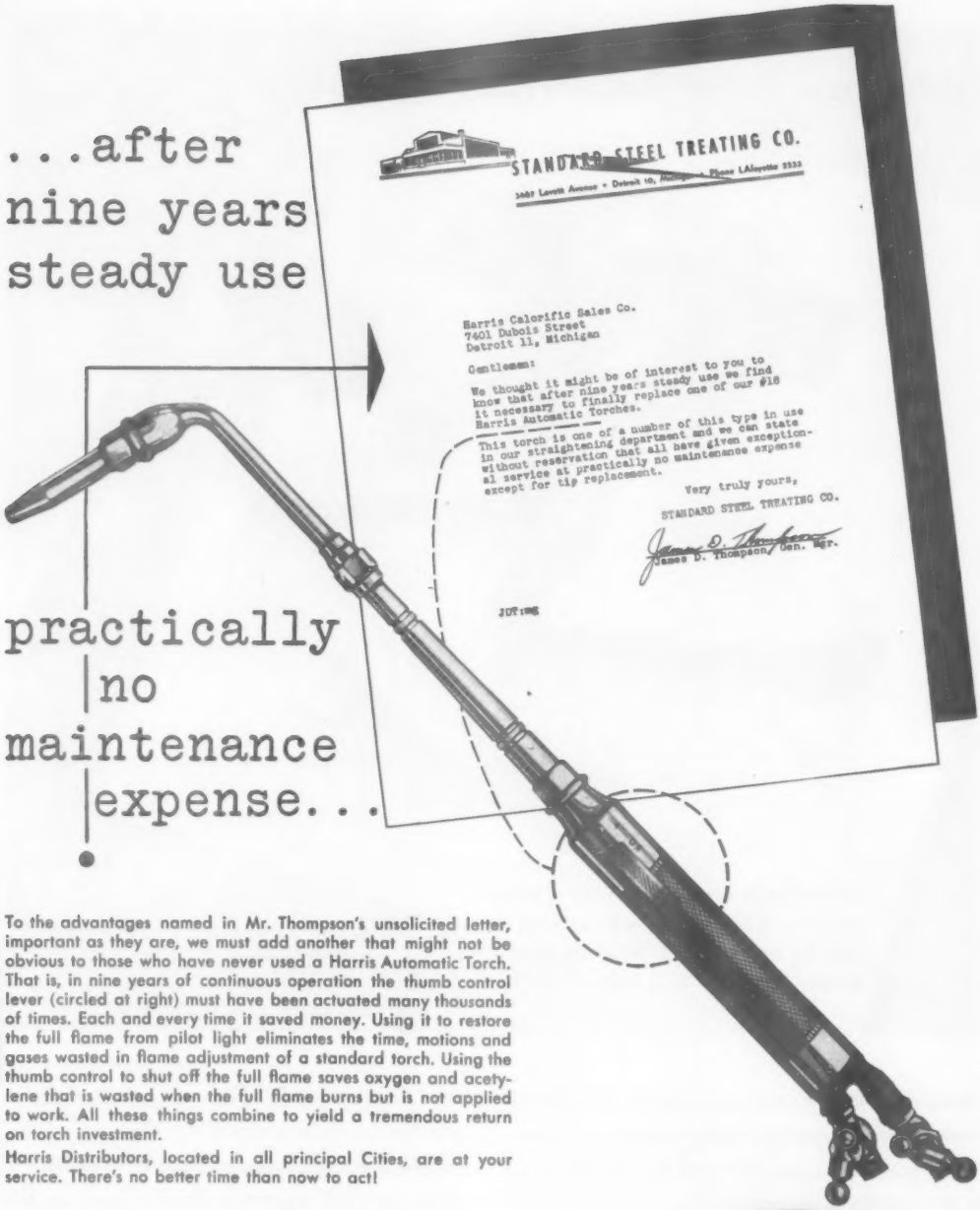
Made by National SINCE 1910 WELDING EQUIPMENT CO., San Francisco 5, California

...after nine years steady use


STANDARD STEEL TREATING CO.
Harris Calorific Sales Co.
7401 Dubois Street
Detroit 11, Michigan
Gentlemen:
We thought it might be of interest to you to know that after nine years steady use we find it necessary to finally replace one of our #18 Harris Automatic Torches.
This torch is one of a number of this type in use in our straightening department and we can state without reservation that all have given exceptional service at practically no maintenance expense except for tip replacement.
Very truly yours,
STANDARD STEEL TREATING CO.
James D. Thompson, Gen. Mgr.

practically no maintenance expense...

To the advantages named in Mr. Thompson's unsolicited letter, important as they are, we must add another that might not be obvious to those who have never used a Harris Automatic Torch. That is, in nine years of continuous operation the thumb control lever (circled at right) must have been actuated many thousands of times. Each and every time it saved money. Using it to restore the full flame from pilot light eliminates the time, motions and gases wasted in flame adjustment of a standard torch. Using the thumb control to shut off the full flame saves oxygen and acetylene that is wasted when the full flame burns but is not applied to work. All these things combine to yield a tremendous return on torch investment.

Harris Distributors, located in all principal Cities, are at your service. There's no better time than now to act!

THE HARRIS CALORIFIC COMPANY

Cleveland 2, Ohio

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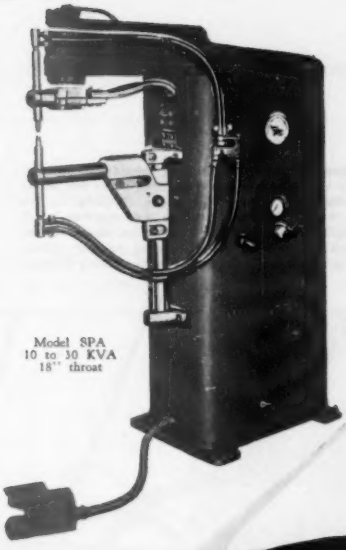
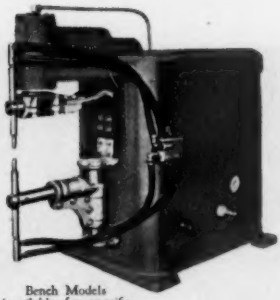


Model SPA
10 to 30 KVA
18" throat

Model SPA
10 to 30 KVA
12" throat
4" cyl.*



Bench Models
(available for specific requirements for bench mounting.)

MODEL SPA SERIES
10-15-20 and 30 KVA

Banner SPOT WELDERS

A BANNER Welder does your job faster — and better. Its special design and construction features raise plant production and efficiency.

ONLY BANNER OFFERS ALL THESE FEATURES . . .

★ BANNER Welders can continuously and accurately weld up to *225 spots a minute.*

★ Time tested proof of a Banner development is the unique design of ram and cylinder and the *long bearing surface of 7".*

★ Up to 7" adjustment on lower knee.

★ Heavily ribbed cast iron head, with integrally cast cylinder *provides utmost rigidity.*
Manganese Bronze piston specially equipped with 3 cast iron double seal (automotive type) rings. *Reduces friction* up to 50% thus permitting necessary follow up *after* welding cycle.

★ Pin and slot arrangement *prevents piston from turning.*

★ Piston actuated by foot switch and *solenoid operated air valve.*

★ Heavy duty selector (with contacting pads of ample cross section) provide *8 stages of heat regulation.*

★ All current carrying members are designed for *over load capacity* and made of high conductivity copper alloy.

★ Secondary and secondary pads are *water-cooled* assuring dissipation of heat in the horns and laminated shunt.

★ Frame is ¾" *boiler plate.*

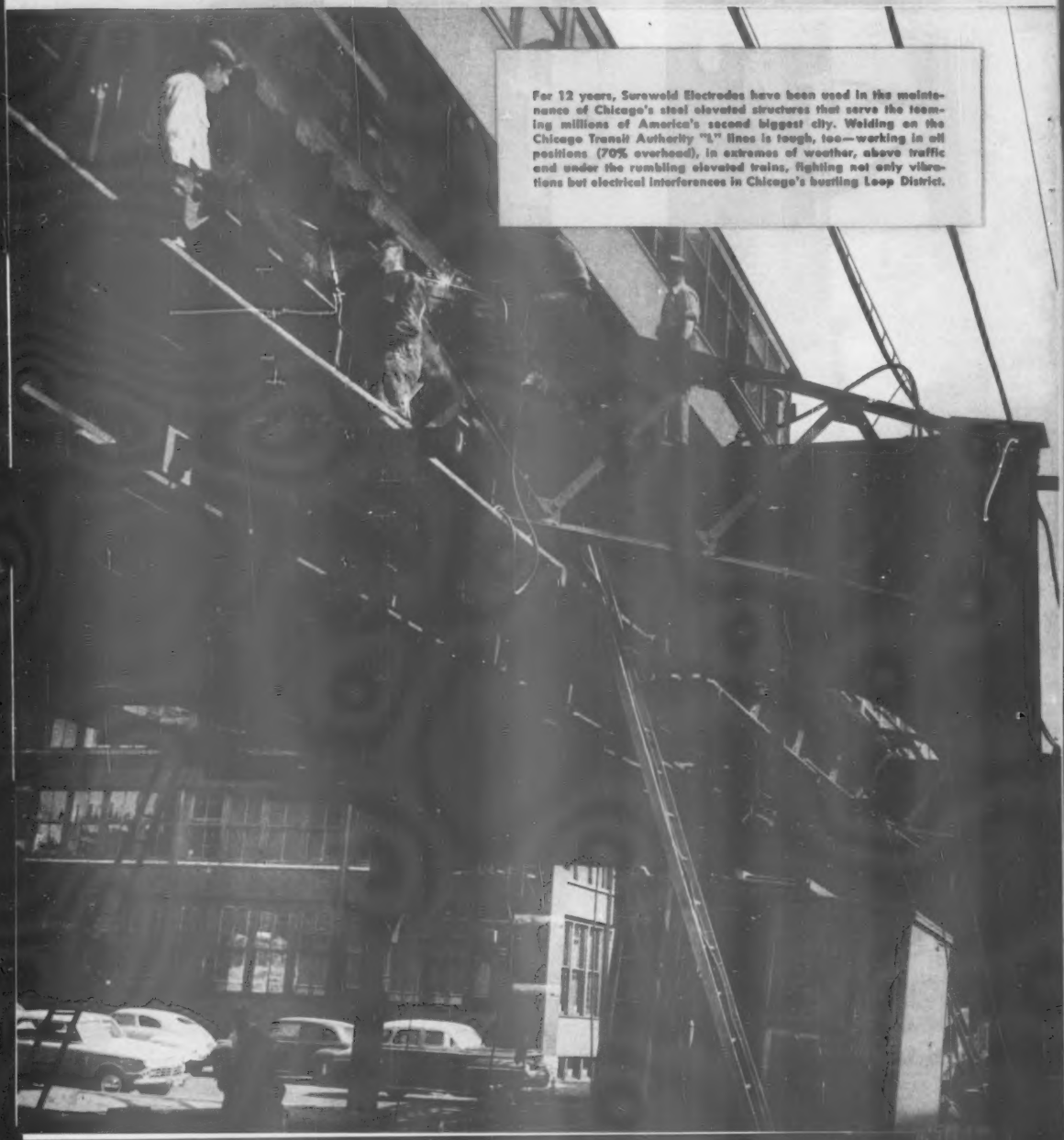
Specific data sheets and catalog available. Write today!

Banner manufactures a complete line of Gun, Seam, Rocker Arm and larger Press Welders and Specials to 200 KVA. Inquiries invited.

*For special application with double acting cylinder and hand valve (for tip dressing). Also available in 30" throat.

BANNER MANUFACTURING CO.
4932 NORTH 29th STREET MILWAUKEE 9, WIS.

Wherever you go...



For 12 years, Surewold Electrodes have been used in the maintenance of Chicago's steel elevated structures that serve the teeming millions of America's second biggest city. Welding on the Chicago Transit Authority "L" lines is tough, too—working in all positions (70% overhead), in extremes of weather, above traffic and under the rumbling elevated trains, fighting not only vibrations but electrical interferences in Chicago's bustling Loop District.

IT'S *Sureweld*® FOR SURE, BETTER WELDS!

North, South, East, West—in big industries and small—Sureweld Electrodes are helping welders get the job done faster, better, easier. New users are discovering every day what thousands of old users have known for years—that Sureweld can be depended on for top performance —whatever the welding problem.

Prove it for yourself! Call in an NCG representative or distributor and let him recommend a rod for the job that's giving you the most headaches. You'll soon learn for yourself that Sureweld excels in speed, easy operation, easy slag removal, low spatter loss and excellent bead appearance. You'll cheer Sureweld's uniformly high quality.

NCG®

EVERYTHING FOR WELDING

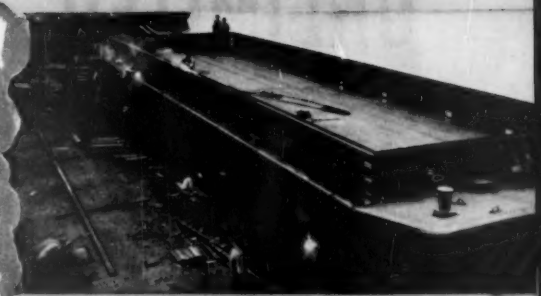
NCG is recognized as one of the largest organizations of its kind in the world. It operates 73 manufacturing plants within the United States, offers supply and service by a vast network of hundreds of independent NCG distributors and warehouses. For assured satisfaction in your welding and cutting needs . . .

RELY ON NCG

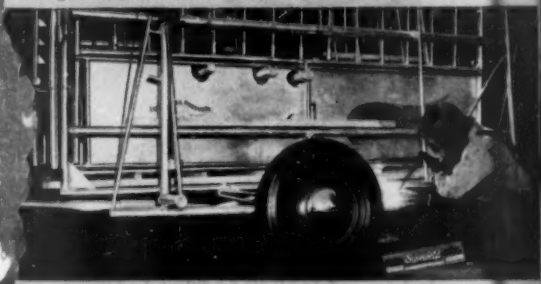
NATIONAL CYLINDER GAS COMPANY

Executive Offices: 840 N. Michigan Ave., Chicago 11, Ill.

Copr. 1951, National Cylinder Gas Co.



"We have used Sureweld Electrodes exclusively for the past six years, and the marked preference of our foremen and welders for Sureweld makes it quite evident that we shall continue to use them 100% in the future," says Jack Frost, vice-president of Wiley Manufacturing Company, Mountville, Pa., manufacturers of floating cranes, steel barges, Wiley Whirleys, concrete buckets and fabricated steel.

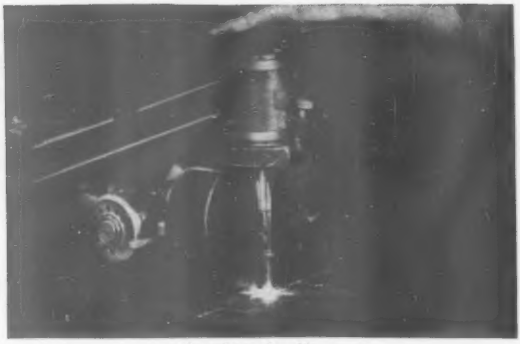


"Our choice has always been Sureweld," says L. E. Heidenbrand, President, Heidenbrand & Son Manufacturing Company, Oklahoma City, Okla., manufacturer of "Silver King" products. Sureweld is used in the production of the 3-in-1 Silver King Cattle Chute, requiring 350 welds per finished unit. "Sureweld C fits our need because it is fast, gives good penetration and welds in all positions," says Mr. Heidenbrand.

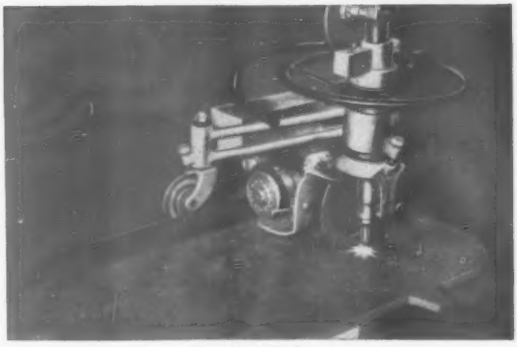
"We like the clean, even beads deposited by Sureweld B—we think it is the smoothest-running wire we have ever used," says F. E. Collier, owner of Charlotte Ornamental Iron Works, Charlotte, N. C., fabricators of "Trustube." "We have used NCG services and supplies since we first started in business, and we like the prompt, friendly attention we always get," states Mr. Collier.

PARTS UNLIMITED

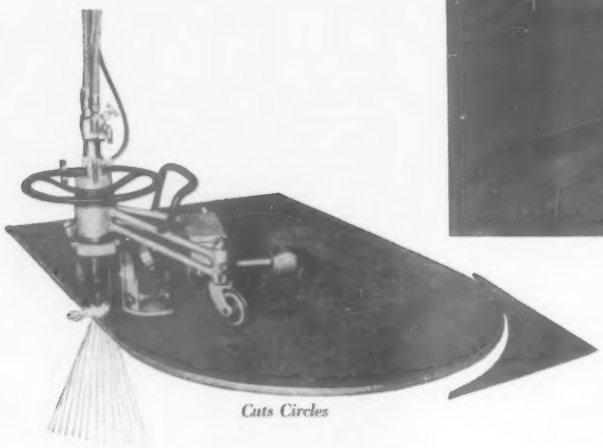
. . . *in Jig Time*



Cuts Irregular Shapes



Cuts Straight Lines



Cuts Circles

In large and small shops alike, the OXWELD CM-16 Portable Cutting Machine fills an unbelievably wide variety of oxygen cutting requirements. It cuts circles automatically. Hand-guided, it cuts irregular shapes. Operated on track, it cuts straight lines.

Indoors or out—wherever steel needs shaping—the CM-16 makes it easy to "tailor" parts as fast as the work can be laid out. *And its ready adaptability for special jobs is limited only by its operator's ingenuity!*

The CM-16 sets up as quickly as any manual outfit. It weighs only 45 lb., travels directly on the work, and is easy to carry from job to job. In normal use, it cuts up to 4 in. of steel; with standard accessories, it cuts materials up to 18 in. thick and it cuts bevels.

Any LINDE representative will be glad to show you how the OXWELD CM-16 Portable Cutting Machine can boost production and cut fabricating costs in your shop. Write for catalog, Form 4487, or call the LINDE Office nearest you today for a free demonstration.

The terms "Linde" and "Oxweld" are registered trade-marks of Union Carbide and Carbon Corporation.

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Oxweld Trade-Mark **CM-16 PORTABLE CUTTING MACHINE**

X-RAY LAB ON WHEELS

brings mountain to Mohammed

X-RAY

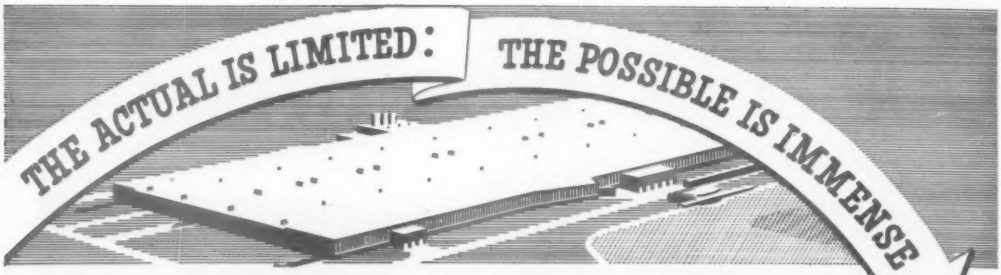
If it's impractical or impossible to check your welds with a stationary x-ray unit, investigate the production-proven advantages of the GE Mobile OX-250. By far the most popular industrial radiographic unit to come out of World War II, it meets today's defense requirements with added features to speed up weld inspection.

Its compact "head," enclosing *all* high-voltage elements, is highly maneuverable. Its quarter-million volt x-ray output assures ample power for thorough, rapid weld penetration. Wheel it where needed or carry it above congested work areas by its crane ring — it's ready to go to work instantly in any location.

General Electric X-Ray know-how can save you headaches arising from either normal welding inspection problems or from defense contracts specifying x-ray examination. A half-century in x-ray, over 30 years of it industrial, and a complete line of apparatus up to 2,000,000 volts, plus a continent-wide factory service organization — these are your assurances of satisfaction when GE X-Ray tackles your inspection problems.

Avoid regrets — investigate non-destructive x-ray inspection NOW. Address X-Ray Dept., General Electric Company, Milwaukee 14, Wis., Rm. AE-7.

GENERAL ELECTRIC



NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

© LE Co. 1951

SAVES 94% WITH WELDED STEEL

Machine designs that utilize the economies of welded steel are always lower in cost. As shown in the development of this typical machine part, substantial production savings are possible because:

Steel costs less per pound and fewer pounds are needed. The initial cost-saving advantage is 7 to 1 with steel, considering strength and safety factors alone.

Approaches to efficient product shape are endless. Stronger materials themselves can be more easily concentrated in the load-carrying areas, giving greater strength, more rigidity per pound of metal. Unlimited combinations of steel shapes can be utilized, enabling lower cost manufacture with a minimum of shop equipment.

Get the facts now. Your Lincoln Welding Engineer will show how your products can be fabricated with less metal and at lower cost. Simply call or write.

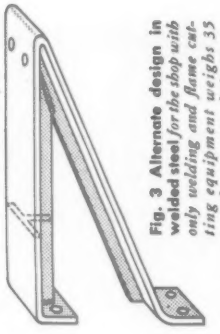


Fig. 3 Alternate design in welded steel *for the shop with only welding and flame cutting equipment weighs 35 pounds . . . costs only $4.70 . . . a saving of 48% over Figure 1.*

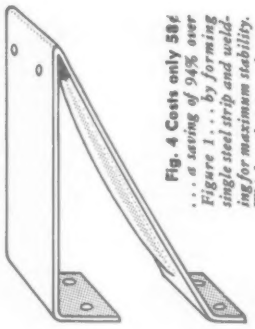


Fig. 4 Costs only 58¢ . . . a saving of 94% over Figure 1 . . . by forming single steel strip and welding for maximum stability. Weighs only 9 pounds.

the ACTUAL

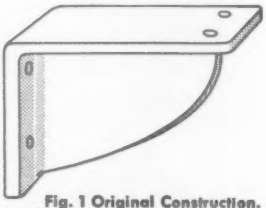


Fig. 1 Original Construction. *Machinery bracket weighs 39 pounds. Has ¾" and ⅜" sections. Requires milling and drilling. Costs $9.10.*

increasing the YIELD

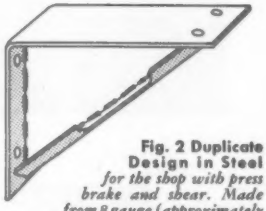


Fig. 2 Duplicate Design in Steel *for the shop with press brake and shear. Made from 8 gauge (approximately ⅛") sheet . . . saves 27 pounds of metal.* Costs $5.13 less than original construction.

the IMMENSITY of the POSSIBLE a saving of 56% in cost

PROGRESSIVE DESIGN CUTS COSTS FURTHER

Machine Design Studies available to designers and production men. Write on your letterhead to Dept. 77,

THE LINCOLN ELECTRIC COMPANY
CLEVELAND 1, OHIO

ESTABLISHED 1916

THE WELDING ENGINEER

JULY, 1951

We Lucky Americans

WE AMERICANS are often inclined to overlook our blessings. This month, the 175th anniversary of the signing of the Declaration of Independence, is a good time to stop and reflect on them.

First of all, we are fortunate that the founders of this nation were courageous. Men who were willing to pledge their lives and risk the lives of their families so that generations to come might be born free.

Every man who signed the Declaration of Independence had either a landed estate, a substantial business, a privileged position in society or, in many cases, all three. He needed nothing. By keeping quiet, he could continue to keep his property, his social position and his life. By putting his name on the Declaration, he became a rebel, a traitor to his king, an outlaw. But these were men who were able to recognize a higher loyalty, a loyalty to all mankind that is expressed in the famous words:

"We hold these truths to be self-evident, that all men are created equal and endowed by their Creator with certain inalienable rights; that among these are life, liberty and the pursuit of happiness."

We are lucky Americans because we have been brought up in the above tradition of equality. By equality, we do not mean, nor did the Signers mean, that all men are equal in everything. Obviously, they are not. Men differ markedly in their physical strength, in reasoning power, in ability to make money, in social charms and other qualities. But there is one respect in which all men in the United States are equal, and that is equality before the law.

We take such equality for granted today, but the truth of it was by no means self-evident. History abounds with instances of peasants who were hung for the stealing of a loaf of bread, while great noblemen went unpunished for rape, arson and murder. Even today, there are some nations in which all men are not equal before the law, but we have long since won that battle in America.

It was a good cause to have fought for. And it has enabled us to progress in 175 years as no other nation ever did in the world's long history.

From the material side of life, we are more than lucky Americans. With one sixteenth of the world's population, living on about a sixteenth of the world's land, we live better than the inhabitants of any other nation. The standard of living today enjoyed by Mr. and Mrs. Average American is one that would have been envied by kings and emperors of a hundred years ago.

Though we Americans represent a little better than 6% of the world's population, we own a very much greater share than that of the world's goods. Because of our production techniques, unfettered under a free economy, we are able to enjoy:

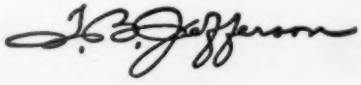
94% of the world's television sets.
92% of the world's modern bath tubs.
85% of the world's automobiles.
60% of the world's life insurance policies.
54% of the world's telephones.
48% of the world's radios.
46% of the world's electric power.
35% of the world's steam railroad mileage.
30% of the world's improved highways.

Our ownership of worldly goods is so far ahead of what it would be on an average percentage basis that we must be already living in that Utopia to which socialists, communists and demagogic politicians have been trying to lead us. But there is more to come. Here in America we consume:

65% of the world's corn.
60% of the world's wheat.
60% of the world's petroleum.
53% of the world's wool.
48% of the world's coffee.
45% of the world's meat.
40% of the world's salt.

And in addition to living better and owning more, we have during the past ten years given away $125,000,000,000 in the form of international gifts, loans and credits.

We most certainly are fortunate to be—lucky Americans.



Look, Ma, I'm welding . . . cast iron!

1. Till today, till this minute, I never saw a welding rod. So help me, Hanna! But these boys say they can teach *anyone* to weld . . . with Ni-Rod! Even advertising writers like me! So here goes . . .

2. Some hat! Some tool! But, holy smokes, I can't even "get a bead" on this thing. Darn rod's alive. Won't stay put. Can't make an arc. *Steady* as she goes, chum. It's all for Ni-Rod . . .

3. Ten minutes, twenty minutes, thirty minutes gone. Now I'm beginning to get the feel. I'll show these birds yet. Stick in there, Ni-Rod. Make me a bead so straight it'll knock 'em for a loop . . .

4. Look, Ma, I'm welding! Here's the bead I laid after 80 minutes of practice. Of course, it's not as good as the top bead which was laid by a professional welder. But it does show how fast guys—or dolls—can start welding cast iron . . . with Ni-Rod.

You've seen what a rank amateur can do with Ni-Rod.

Just think what your trainees and experienced welders could do!

It's easy to use and seldom requires pre-heating or post-heating. This is extra important in these days of scarce labor, for even unskilled help can learn to weld with Ni-Rod.

Right now you may find Ni-Rod hard to get because so much is diverted to military and defense needs. But your distributor will keep you posted on availabilities.

THE INTERNATIONAL NICKEL COMPANY, INC.,
67 Wall Street, New York 5, N. Y.

Remember –

the trade marks "tt" and "TUBE-TURN" are applicable only to products of TUBE TURNS, INC.

In special alloy piping systems, alloy TUBE-TURN Welding Lap Joint Stub Ends permit use of lower-cost carbon-steel flanges as shown in cut-away view.

Special alloys lick special piping problems

Write Dept. N-7 for free booklet "Pipe and Fitting Materials" which gives specifications, properties and welding procedures for various materials.

YOU can overcome special problems of corrosion, fluid contamination, pressure, or temperature by selecting pipe and welding fittings of special materials.

Tube Turns, Inc. continually studies the proper application of different materials to piping systems. The complete line of TUBE-TURN Welding Fittings is available in more than forty different alloys. Today's piping engineer can choose from intermediate and high alloy steels containing chromium, nickel, or both; commercially pure nickel, copper, and aluminum; and alloys of these.

Get in touch with your nearby Tube Turns' Distributor. You'll find one in every principal city.

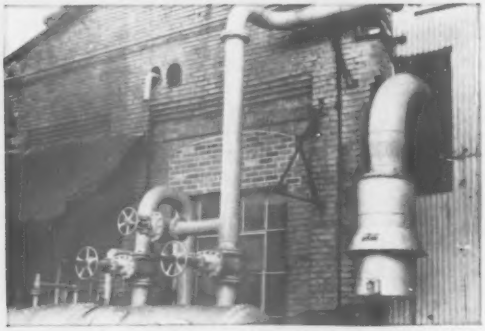
"Be sure you see the double tt"

TUBE TURNS, INC. LOUISVILLE 1, KENTUCKY

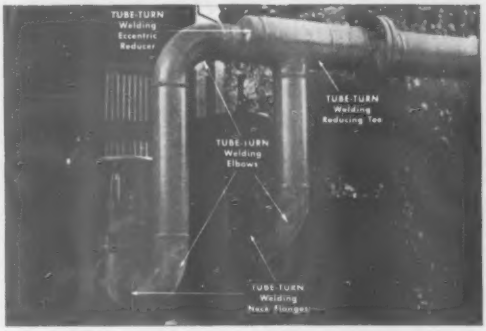
DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Chicago • Houston • Tulsa • San Francisco • Los Angeles

TUBE TURNS OF CANADA LIMITED, CHATHAM, ONTARIO . . . A wholly owned subsidiary of TUBE TURNS, INC.

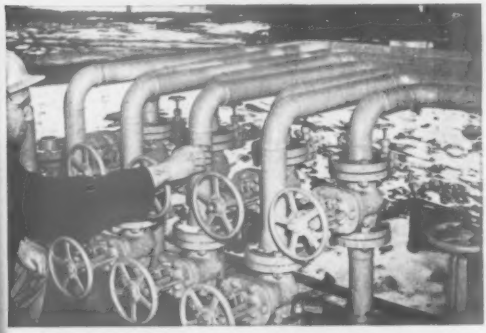
Piping construction simplified by wide range of TUBE-TURN Welding Fittings



Welding complex process piping calls for a wide variety of fittings and flanges. In this installation, air is drawn into compressor through a 16-inch line, connected to an outdoor filter through a TUBE-TURN Welding Reducer. Air at 100 lbs. is piped to the compressor tank through an 8-inch welded line.



Manifold serves air lines to various shops. Matching the two 8-inch lines to the 12-inch line here was no problem. Use of a TUBE-TURN Reducing Outlet Tee and a TUBE-TURN Eccentric Reducer made the construction job easy. The main line can be opened easily at the TUBE-TURN Welding Flanges.



Small lines tap off fire foam chemical manifold, lead to storage areas and other critical locations. Leakage or weak joints here could be disastrous. Welded piping with strong TUBE-TURN Welding Fittings makes this fire protection reliable.

In fabricating, welders appreciate the true circularity of TUBE-TURN Welding Fittings. To fill an immediate need, a welding elbow is often cut to make an odd-angle welding fitting. Unique forging process assures that TUBE-TURN Welding Elbows can be cut at any angle and still match the pipe for proper welds.

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City _____ *State* _____

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TUBE TURNS, INC.

LOUISVILLE 1, KENTUCKY

JAMES W. DUNHAM (left), National Cylinder Gas Co., Chicago, receives the Morehead Medal from Arthur J. Fausek, president, Modern Engineering Co., St. Louis

AT REGISTRATION desk are Si Greenberg, technical secretary of the American Welding Society, and R. W. Shearman, publicity and arrangements committee of IAA

IAA Goes to Montreal

Lavish Canadian hospitality and good fellowship between visiting Americans and their northern neighbors made the Montreal meeting one never to be forgotten.

BY CLYDE B. CLASON

FROM registration on Monday May 21 to the final goodbyes said when the train from Shawinigan Falls pulled into the Montreal station for homeward connections . . . this 51st annual convention of the International Acetylene Association was fun.

We should also add that the convention was superbly stage managed. Everything ran as smoothly as clockwork.

Montreal was a happy choice for the convention setting. This Paris-of-the-North, with its two-thirds French population, has much of the allure of the Old World capital, including restaurants to delight the gourmet and the epicure. Montreal can also boast of a remarkable Mayor.

The warmth of the welcome extended by His Worship Camillien Houde left most IAA members gasping for breath. His reception at the City Hall is one of those occasions that will linger long in the memory with a pleasant glow.

Luncheon Meeting

Registrations totaled near 300, but around 400 showed up for the opening Monday luncheon. Victor G. Bartram, president of Shawinigan Chemicals, Ltd., Montreal, serving as chairman of the luncheon meeting, introduced Mayor Houde, who gave a few facts on Montreal. The city, revealed its mayor, now has a total population of 1,600,000, of whom 1,000,000 are of French descent and 350,000 of Anglo-Saxon and Scotch descent.

Claude E. Monlux, retiring president, packed a wealth of information into the president's traditional annual address. Said Monlux: "Since its inception our industry has grown at a faster rate than the industrial productive capacity that it serves."

During World War II, he went on, the production of dissolved acetylene gas in the United States and Canada from 1939-1944 increased approximately 400%. The production of oxygen during the same period increased slightly more than 400%. During the same period, steel production in the United States and Canada increased slightly less than 70%.

"Today," Monlux concluded, "the demands upon our industry are even greater than they were during the peak years of World War II. This is true of all three major products: oxygen, calcium carbide and its end product, acetylene gas . . . I am confident that we will meet these demands and any necessary demands that may be put upon us in the event of total war —which God forbid."

This year's Morehead Medal was given posthumously to the late M. Keith Dunham, founder of the National Cylinder Gas Co., and president of that organization at the time of his death in September, 1940. The medal was accepted on his father's behalf by James W. Dunham, vice-president of the National Cylinder Gas Co. The presentation was made by Arthur J. Fausek, president of the Modern Engineering Co., St. Louis.

The feature address was given by one of Canada's most distinguished citizens, Colonel Edwin A. Baker. Colonel Baker was blinded by a sniper's bullet during World War I. Since that time, as managing director of the Canadian National Institute for the Blind, he has devoted his life to the helping of other men who have the misfortune to lose their vision—a work that he terms "human engineering." The Institute endeavors to give every blind man a new career in which he can support himself by his own efforts.

Technical Sessions

An innovation at an IAA convention was the holding of two simultaneous technical sessions—one billed as "Engineering" and the other as "Operations." Six papers were given

CITY HALL where mayor's reception was held. Police-escorted buses conveyed IAA members swiftly through the heavy 5 p.m. traffic of Montreal

HIS WORSHIP Camillien Houde, the Mayor of the City of Montreal

in the scant two hours sandwiched between the luncheon meeting and the Mayor's 5 p.m. reception.

Session co-chairmen of the Engineering session were Russ A. Dunn, sales manager of Canadian Liquid Air Co., Ltd., Montreal, and Ron M. Gooderham, general manager, Canadian Welding Bureau, Toronto. There were three speakers.

George F. Nordenholt, editor of *Product Engineering*, New York City, tossed aside his announced subject, "The Importance of Welding Engineering in Design" and spoke informally and extemporaneously. Leonardo da Vinci, Nordenholt began, is now famous as an inventor, but in his own time his remarkable inventions never got beyond the drawing stage. The answer is that they were too far in advance of the production processes then available. A true design engineer, stressed Nordenholt, must know above everything else the production machinery and processes he can call upon to get his ideas into their final shape.

Energy is the fundamental necessity of every production process. In the oxyacetylene flame, industry has available a tremendous amount of energy that requires only a portable instrument to put it in use.

H. S. Swan, welding engineer, American Locomotive Co., Schenectady, N. Y., talked upon improved production methods for the flame-cutting of parts for Diesel locomotives. "One of the biggest problems on repetitive cutting," he said, "has been the quick and easy relocation of either template or work for a repeated cut. An extremely satisfactory solution is to support the work on cars which may be moved lengthwise of the cutting area so as to locate the work for a repeated cut. In some cases, the magnitude of the cutting has required a car 13 by 24 ft, and its size necessitated a power drive."

The third paper was by William J. Small, superintendent of the Niagara Falls Public Schools, Niagara Falls, N. Y. Speaking as an educator rather than as an expert in welding, Mr. Small had some useful ideas to contribute on training programs.

Sessions co-chairmen for the simultaneous "Operations" session were R. K. Thoman, assistant general manager, Canadian Vickers, Ltd., Montreal, and Professor R. E. Jamieson, Department of Civil Engineering, McGill University, Montreal. Again three papers were given.

Of Men and Maintenance

One especially good job was that by John H. Redmond, assistant manager, production department, Koppers Co., Inc., Pittsburgh, on the subject of maintenance problems in the accelerated defense program.

The four basic items which enter into maintenance problems are men, machines, materials and money. He discussed each of these with particular reference to the factors that affect the defense program. Some of his thoughts are well worth noting.

Men: "I would suggest that, in hiring new men, those of selective service age be included, even if they can be used for only six months before being called. Later, when they return from the service, you will find that they are the type of men you want in your organizations."

Materials: "Once again, it is a question of function, of getting the job done, and any material that can fill the requirements is an acceptable substitute. It may well be that each of us will come out of this period with an increased store of knowledge and experience that will save us time and money in the years ahead."

Machines: "Maintenance welding crews often will be called upon to perform the impossible and the miraculous in the months and years ahead. As production is stepped up, in line with the accelerated defense program, machine tools will be assigned quotas absolutely fantastic in the light of past performance. Schedules will be established that will greatly increase the wear and tear on all machines and equipment. Breakages and breakdowns will be much more numerous; new or replacement parts often unobtainable. Maintenance welding crews will be confronted with many problems that would not be put up to them at all in normal times."

Money: "Deferring maintenance to a more convenient time is expensive. Machines can be run 24 hours a day, 7 days a week for a certain length of time but not forever. Mandatory periods must be provided when skilled maintenance men can inspect the machines and make adjustments and repairs to prevent partial or complete breakdown. Let us not fool ourselves by keeping our machines running as long as they will run.

"Deferring maintenance today means only that you are taking money that should go into maintenance and

COLONEL BAKER, luncheon speaker (left); Claude E. Monlux, retiring president; Herb Reinhard, secretary

NEW PRESIDENT James W. Dunham was caught in conference with F. W. Hench, the new IAA vice-president

throwing it into profit, which is taxed at a very high rate. It is unwise for any plant to jeopardize its future, inflate its profits, and thereby increase its taxes, by failing to maintain its equipment in good operating condition."

Pipe Fabrication, Safety

Another excellent paper was given by Edgar P. Auler, superintendent of pipe fabrication, Taylor Forge and Pipe Works, Chicago, on the oxyacetylene processes used for the fabrication of pipes and the assembly of pipes and fittings. Three tools are basic to pipe fabrication, said Mr. Auler: the oxyacetylene cutting torch, the oxyacetylene gouging torch, and the oxyacetylene heating torch. The flame-gouging torch is used for progressive gouging of the undersides of arc welds, for spot gouging of temporary tack welds and for the removal of defective weld metal and the forming of welding grooves. The oxyacetylene heating torch provides a convenient source of localized heat for such operations as forming and bending, straightening, preheating and postheating.

The important topic of safe practices in welding and cutting was allotted to the capable hands of Simon A. Greenberg, technical secretary of the American Welding Society. "Si" began with a rather startling statement: "According to statistics, you are probably safer while welding than while driving your car along a highway on a holiday weekend."

That welding is safe is no accident. Safety in welding and cutting has been achieved through the coöperative effort of management, employees, equipment manufacturers and other interested parties. Organizations such as the American Welding Society and the International Acetylene Association provide the means for bringing these different interests together and promoting the general use of good welding, said the speaker.

That Mayoral Reception

Presentation of the six papers just discussed was somewhat rushed and discussion had to be eliminated because of the need to make the 5 o'clock date at the City Hall. It is no easy job to get through Montreal traffic at closing time, but Mayor Houde came to the rescue by providing buses and a police escort. He also provided cocktails and a buffet spread the like of which is rarely seen on this side of the border. Southern hospitality was put in the shade! A gracious host, Mayor Houde made all of his 300-and-something guests feel that they really were welcome in Montreal.

Tuesday, the second day of the convention, was marked by the annual business meeting and by technical discussions for members only. The business meeting was called to order by President C. E. Monlux. The customary reports of the secretary and the consulting engineer were combined into one report, presented by Secretary H. F. Reinhard. The report of Treasurer E. V. David revealed that the treasury is still in a healthy state despite an expenditure of $22,780 for the film, "The Oxyacetylene Flame—Master of Metals." This all-star production, according to the secretary's report, has already had 2,673 showings to an audience totaling 140,037 and additional television showings in Birmingham, Memphis, Baltimore and Bloomington, Ind., estimated to reach 646,800 televiewers.

The report of the Oxyacetylene Committee was delivered by George R. Webster, secretary, in view of the absence of Chairman A. M. Setapan, a sufferer from chicken pox. The report of the membership committee was given by Chairman Henry Booth, of Shawinigan Products Corp., New York. Mr. Booth suggested the possibility of going after large acetylene users of the chemical industry as potential new members. The amount of acetylene used in chemical processes now exceeds the amount that is utilized for welding and cutting—though this part of the business has by no means stood still.

Clarence McL. Pitts, of The Peoples Gas Supply Co., Ltd., Ottawa, gave the report of the resolutions committee. Resolutions were introduced and voted to thank the management of the Windsor Hotel for accommodations, to thank the staff who took care of registration and distributed tickets, to thank His Worship the Mayor of Montreal for the courtesies extended to the association and to thank Shawinigan Chemicals for acting as host on the third day of the convention.

Another resolution was passed to thank Chairman Tom C. Fetherston, chairman of the publicity and arrangements committee, and his associates G. Van Alstyne, R. W. Shear-

(Continued on page 44)

WHEN DISSIMILAR metals are bonded together, bronze electrode deposits produce a braze-welded bond (Fig. 1, left) with alloys in iron-base or nickel-base groups or a weld bond (Fig. 2, right) with copper-base alloys

Jobs You Can Do

Bronze electrodes, very versatile, can be used both to join metals and for overlays. In joining, they are used to weld both like and dissimilar metals and alloys.

5—HIGH-IRON aluminum-bronze fractionating tower was carbon-arc welded with aluminum-bronze electrodes (E Cu Al B) used as filler rods. Skirt of ½-in. carbon steel was welded directly to the aluminum-bronze head without preheat.

BY F. E. GARRIOTT

Ampco Metal, Inc., Milwaukee

MANY of the electrodes in the phosphor-bronze and aluminum-bronze groups can be used interchangeably to weld copper, the various copper alloys, nickel-copper alloys as well as the more "difficult to weld" iron-base metals such as cast and malleable irons, high-carbon steels, low-alloy steels, tool steels and manganese steels. Dissimilar metals and alloys are also joined with these bronze electrodes; *i. e.*, copper-alloy to iron-base or nickel-base metals.

In dissimilar metal welding, bronze electrode deposits produce a braze-welded (Fig. 1) bond with iron- or nickel-base alloys and a weld bond (Fig. 2) with copper-base alloys. Braze welding is a new term developed to distinguish this type of joint from brazing where the bond is secured through capillary attraction.

Types of Applications

Bronze electrodes are used extensively for overlay applications. The deposits are highly resistant to corrosive media such as salt water, many acids and mild alkalies. The use of bronze overlays and inlays for bearing surfaces is well known; they can also be used for other surfaces subject to excessive wear from metal-to-metal contact.

Contrary to popular belief, bronzes may be rather soft for use in some bearing and joining applications. This is exemplified by the phosphor-bronze electrode deposits. They may also be very hard, like the hard grades of aluminum bronze, for wear-resisting overlay applications.

Electrode Selection

The selection of the most desirable bronze electrode for a given application does present a problem at times. We'll endeavor to tell some of the factors involved, limiting the discussion to electrodes of the tin and aluminum bronze classifications.

The four definite steps to be considered in the selection of an electrode for a specific job are: (1) base metal composition, (2) mechanical property requirements; (3) deposition characteristics; (4) service requirements. With regard to the latter, it makes a difference whether the electrode is to be used for joining or for overlay. If for overlay, we must determine whether it will be for a bearing or to resist corrosion or wear.

3—WATER HEATER shells are rolled from 14-gage silicon bronze, welded with phosphor-bronze electrodes

4—WORN AREAS on bronze turbine runner were built up with phosphor-bronze deposits at saving of $4,800

with Bronze Electrodes*

One of the greatest difficulties encountered is that the man who has to weld a copper alloy may not know the composition nor even the general alloy classification of the base metal. There are hundreds of copper-alloy compositions on the market, many of which are not weldable. Fortunately, however, most of the alloys used in quantity for fabrication are weldable with at least one electrode.

A man with experience may identify copper alloys by means of color, hardness or welding characteristics. It is obvious, however, that such methods of identification are only advisable for emergency repairs. The only sure method of identification is a chemical analysis.

If the base metal composition is known (and it should be if satisfactory results are to be obtained), the problem of selecting the proper electrode is greatly simplified.

What Mechanical Properties?

The next step is to determine the mechanical properties that will be required by the joint or overlay. Electrodes are available to match and produce deposits with mechanical properties approximating those of most copper-alloy base metals (see Engineering Data Sheet No. 130, page 49 this issue). The exceptions, of course, are the brasses, for which either a phosphor-bronze or aluminum-bronze electrode must be used, depending upon the base metal composition and mechanical property requirements. For example, phosphor-bronze electrodes should be used to weld the low-strength brasses, and aluminum-bronze electrodes should be used for welding the high-strength brasses. Obviously, the best color match is obtained through the use of aluminum-bronze electrodes.

With iron-base metals, it's the ultimate tensile strength that generally determines the bronze electrode to be used. Most cast irons, for example, have a tensile strength of around 40,000 to 45,000 psi. A phosphor-bronze electrode with a deposit tensile strength within this range should be adequate, depending, of course, upon other variables.

For high-carbon and alloy steels with tensile strengths from 70,000 psi and higher, the aluminum-bronze electrodes must be selected.

Welding Dissimilar Metals

If a copper alloy is to be joined to an iron-base metal, select an electrode that matches the copper alloy in composition and mechanical properties. If two different iron-base or two different copper alloys are to be joined, select a bronze electrode producing a deposit of tensile strength within the range of the alloy or metal having the lowest tensile strength.

In overlay welding, deposit hardness is, in many cases, the deciding factor for electrode selection. Bronze electrodes are available covering a very broad range of hardness from 70 (500 kg load) to around 300 (3,000 kg load) Brinell. Other service requirements such as corrosion resistance must also be taken into consideration.

Deposit Characteristics

With reference to deposition characteristics, all copper-alloy electrode deposits flow freely in the iron-base and nickel-base metals. In matching plate materials, however, the deposits inherently flow rather sluggishly. Flow characteristics in matching base metals can be improved by the following methods:

1. Use wide grooves with a 60-deg to 90-deg V or a modified U design.

2. Preheat and maintain fairly high interpass temperatures. A good general rule to follow: Preheat around 300 F for iron-base metals, 400 F for the bronzes (an exception is silicon bronze, which should not exceed 150 F), 500-800 F for the

*Abstract of a paper presented at twelfth annual Ohio State Welding Engineering Conference, April 13-14 at Columbus.

6—BEFORE WELDING, a broken cast-iron gear housing for a tractor. The edges were beveled and cleaned

7—AFTER WELDING with aluminum-bronze electrodes (E Cu Al A), the casting in Fig. 6 is as good as new

brasses and 800 F or higher for copper.

3. Flow characteristics can also be controlled by the welding currents used. Use the low side of the recommended range for welding the iron-base or nickel-base metals in order to obtain a braze-welded bond; use the middle of the range for welding the bronzes in order to secure a true weld bond; use the high side of the range for welding copper-zinc alloys (brasses) and copper, selecting the largest diameter of electrode possible.

All surfaces to be joined must be clean and dry in order to avoid porosity, undercutting and slag entrapment.

In overlay welding, the surface should be undercut for a deposit thickness of between 3/16 and 1/4 in. when finish machined. If the overlay is made on iron-base or nickel-base metals or alloys, the first layer should be applied with a fast weave motion in order to secure a minimum pick-up from the base metal. Generally, such deposits should be built up with a minimum of three layers. After the first layer, subsequent layers may be applied by using a weave technique or with string beads.

Phosphor-Bronze Electrodes

Two phosphor-bronze (tin bronze) electrodes are covered by the AWS-ASTM "Tentative Specification for Copper and Copper-Alloy Metal-Arc Welding Electrodes." These have the designation E Cu Sn A and E Cu Sn C. The difference between them is in the composition of the core wire. The E Cu Sn A electrode has a phosphor-bronze grade A core wire with a nominal tin content of 5%, and the E Cu Sn C contains a phosphor-bronze grade C core wire having 8% tin. The balance in each case is copper except for 0.15-0.25% residual phosphorus, from which the name is derived.

Most of the phosphor-bronze electrodes on the market today are of the grade A classification because it provides higher ductility of the weld metal at only a slight sacrifice in tensile strength, yield strength and hardness. Also, phosphor-bronze grade A matches the composition of the sheet and plate used for corrosion-resistant chemical processing equipment.

Phosphor-bronze electrodes may be used to join copper, the tin bronzes, the low-strength brasses (under 50,000 psi), cast irons, galvanized iron and dissimilar metals. Exceptions are the tin bronzes and brasses that contain lead. The high-lead brasses and bronzes are considered unweldable if dense deposits are required. Lead does not alloy with copper but remains in the free state unevenly distributed. At welding temperatures, the lead volatilizes and leaves a porous deposit.

Usually, phosphor-bronze electrodes are recommended for downhand welding only; many of them, however, can be used in the vertical and overhead positions if necessary.

Phosphor-bronze deposits do have a tendency to develop a coarse grain structure as welded. This results in low mechanical properties of the joint if certain precautions are not taken during welding. You can refine the grain structure by: (1) preheat and interpass temperature of around 350 F; (2) use of fast string beads instead of weave beads; (3) hot peening; (4) stress relieving after welding.

Making Water Heaters

Let's look at an example of a joining application with E Cu Sn A electrodes. Shells of the fabricated bronze water heaters shown in Fig. 3 are rolled to shape from 14-gage silicon bronze. The rolled sheets are tacked, and the longitudinal seams welded with 1/8-in. electrodes using reverse polarity, d-c. No edge preparation is necessary, but a slight space is left when the edges are butted together. A removable copper back-up bar is used to eliminate burn-throughs. The weld deposit penetrates sufficiently to give a small, very smooth bead on the inside, which requires no finishing after welding.

The spuds are welded to the shell by horizontal fillets with the same electrodes. Heads and shell are then assembled in a rotating fixture and welded together without any edge preparation. Brackets are welded on, and the tanks are hydrostatically tested for leaks.

The tin bronze turbine runner shown in Fig. 4 was worn in service through cavitation and erosion. The worn areas were built up with E Cu Sn A electrode deposits at a saving of $4,800.

An electric hoist was used to position the runners, allowing the casting to be tipped at any angle. All sponge metal was chipped and ground

8—EXHAUST STACK sections of 11-gage galvanized iron were braze welded into a stack six stories high

9—OVERLAY deposited from E Cu Al A electrodes reduced corrosion and erosion on a heat exchanger head

out of the pitted areas. The casting was then preheated to 100 F, and the same interpass temperature was maintained during welding. E Cu Sn A 5/32-in. electrodes were used to fill in the deep areas and 1/8-in. electrodes where low flat beads were required. After welding, the repaired areas were ground to contour. A continuous troweling motion was necessary while grinding in order to avoid flat spots (obtained if the grinder remained too long at one point). After grinding, the runners were balanced prior to remounting.

For many grades of cast iron, phosphor-bronze electrodes can still be used and will produce a satisfactory joint. Generally, however, the aluminum-bronze electrodes will provide more satisfactory welds in a greater variety of cast irons.

Phosphor-bronze electrodes are used rather extensively for soft bearing overlays and inlays within the hardness range of 70 to 100 Brinell (500 kg load). For bearing service, select a bronze electrode giving a deposit hardness 50 to 75 points Brinell under that of the mating material.

Aluminum-Bronze Electrodes

Five aluminum-bronze electrodes are classified under AWS-ASTM specification with the designations E Cu Al A, B, C, D and E. The differences are to be found in the aluminum and iron contents. Tensile strength, yield strength and hardness of the deposits produced with these electrodes are considerably higher than those with other copper-alloy electrodes.

Tensile strength of the E Cu Al A deposit varies with the alloy or metal being welded. In low-strength brasses, ultimate tensile strength may run as low as 65,000 psi. In some iron-base metals, ultimate tensile strength of deposit may run as high as 110,000 psi.

These electrodes are extremely versatile in application. The E Cu Al A and B electrodes are used to join the low-iron aluminum bronzes, the high-iron aluminum bronzes, silicon bronzes, high-strength brasses, some nickel-copper alloys, all of the more difficult-to-weld iron-base metals and dissimilar metals. The other three electrodes are used for joining matching grades of aluminum bronze.

In joining with E Cu Al A and B electrodes, remember that low preheats and low currents should be used for the iron-base metals; medium preheats and currents for the bronzes; high preheats and currents for the brasses and copper.

Wider grooves are recommended than for the welding of steel. Either weave or string beads may be used with equal success. Bead thickness has little effect upon deposit mechanical properties since the deposits have exceptionally good hot ductility and strength. The deposit is not hot-short like that produced with silicon-bronze electrodes and does not tend to develop a coarse grain structure like that produced with phosphor-bronze electrodes.

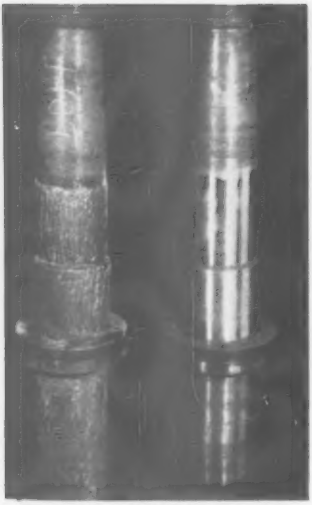
The fractionating tower shown in Fig. 5 was carbon-arc welded with coated E Cu Al B electrodes used as filler rods. The tower shell and all internal parts such as trays, downcomers and dams were constructed from 3/8-in. aluminum bronze. The vapor risers are 2½-in. OD by 2-in. ID extruded tubing. Van Stone type nozzles are utilized throughout with steel back-up flanges. The skirt of the tower is made of ½-in. carbon steel; this material was welded directly to the aluminum bronze head without preheat.

A high-iron aluminum bronze plate was selected for this fractionating tower because of its high strength, high thermal conductivity and excellent resistance to corrosion and erosion.

A Cast-Iron Repair

As an example of a repair job, look at Fig. 6. This cast-iron gear housing for a TD-18 tractor was broken in service. The broken edges were beveled from both sides to a 45-deg included angle. Excess grease was burned off with a torch, and the weld area was thoroughly cleaned with carbon tetrachloride in preparation for welding. The job was then set up, clamped in position and preheated to approximately 300 F.

The outside welds were made first and staggered to distribute the heat more evenly. Where fit-up was poor, the initial layer was applied with 1/8-in. E Cu Al A electrodes and a finish pass with 5/32-in. electrodes. Where fit-up was good, one layer with 5/32-in. electrodes was sufficient. All welding was done in the downhand position. After completing the outside weld, the casting was turned so



10—COAL PULVERIZER shafts. Left: as overlaid with E Cu Al C deposits; right: after machining

that the inside welds could be made. The outside beads were then ground flush. The completed repair job is shown in Fig. 7.

E Cu Al A electrodes were selected for this repair job because the deposits are very dense and ductile and produce a braze-welded bond with low dilution from base metal. Therefore, weld and fusion zone cracking did not occur in the highly stressed assembly.

The galvanized iron exhaust stacks in Fig. 8 were metal-arc welded with E Cu Al A electrodes. These foundry ventilator stacks were 36 in. in diameter and were six stories high when assembled. They were fabricated from 11-gage galvanized iron and were welded with 1/8-in. diameter E Cu Al A electrodes using reverse polarity, direct current.

Welded construction was selected in preference to riveting in order to save time and metal weight. Complete riveted design was originally specified, but this was changed to allow all subassemblies to be welded in position in the shop for ease of fabrication. E Cu Al A electrodes were selected because they could be applied at relatively low amperage settings. The lower melting point of the alloy had four distinct advantages: (1) burn-off of the zinc coating on the pipe adjacent to the weld was held to a minimum; (2) the braze-welded bond was as strong and ductile as the base plate; (3) undercutting was eliminated; and (4) no back-up strip was required since the deposit penetrated sufficiently to provide a small bead on the inside.

All of the aluminum-bronze electrodes are used extensively to overlay bearing, wear- and corrosion-resistant surfaces. The service life of heat exchanger heads, for example, was extended by overlaying the inside of these heads with E Cu Al A deposits as shown in Fig. 9. In this particular job, the aluminum bronze overlay was applied with 1/4-in. electrodes. The metal was deposited with a fast, wide weave to minimize base metal pick-up. The heads were put back into service without finish machining. The overlaid surface served to resist both corrosion and erosion due to the flow of corrosive liquid.

Overlaid Bearings

The aluminum-bronze electrodes producing deposits of high hardness, (from around 200 to 300 Brinell) are widely used for overlaying surfaces subjected to severe wear from metal-to-metal contact. Applications include dies for drawing and forming stainless and mild steel, steel mill strip and sheet guides, gears, sheaves, pinions, wear plates, etc.

The Raymond mill journal shafts shown in Fig. 10 are used in machinery for pulverizing coal. These shafts carry the rollers in contact with the grinding rings and must withstand high compressive loads and abrasive wear from powdered coal.

The shaft at the left of Fig. 10 has been overlaid on the bearing surfaces with E Cu Al C electrode deposits; it's shown in the as-welded condition to illustrate bead sequence. The shaft at the right shows the deposit after machining.

Cable idlers and pulley sheaves present another metal-to-metal wear problem. The wear is on both the idler or sheave and also on the steel cable. In many cases, a worn groove on the idler or sheave tends to bind and break the mating steel cable. This worn surface can readily be rebuilt with aluminum-bronze deposits.

The usual procedure in repairing a sheave is to mount it on a shaft so that it can be turned. The worn section is filled in with 3/16 and 1/4 in. electrodes while the wheel is rotated away from the operator so that the molten metal and slag will flow behind the arc crater. A weaving motion, usually the width of the groove, is employed.

In the majority of cases, the weld deposit is sufficiently smooth as-welded to eliminate finishing by grinding or machining. In most cases, such overlaid sheaves last longer than the original equipment. A further saving in wire cable can be attributed to the low coefficient of friction between the aluminum-bronze overlay and the steel rope.

Gear teeth worn in service are often built up to original dimensions with aluminum-bronze deposits. When aluminum-bronze is applied to iron-base gears, the resultant deposit is smooth and free of craters and can be put into service as-welded. Also, the relatively low welding heat minimizes the effect of welding upon any heat-treat properties that may be present. A non-seizing, non-galling bearing surface reduces the wear from friction.

Less Wear on Dies

E Cu Al E electrodes are used quite extensively for overlaying drawing and forming dies used in the forming of stainless and mild steel. Prior to the use of E Cu Al E overlaid punches and die rings, for example, chrome-plated tool-steel dies showed an average production life of 3,600 parts. With the overlaid die sets, average production increased to 15,000 parts before any appreciable signs of wear showed on the dies.

Since all of the die punches and rings in use were tool steel, it was necessary to anneal them prior to machining. They were machined 1/4 in. undersize and overlaid with 3/16-in. electrodes, using a preheat of 300-400 F. Upon completion of the welding, the dies were cooled in an air blast to develop the full hardness of the deposit. They were then machined and placed into service.

Under present restricted use of materials, long delivery dates, increasing production and replacement costs and the "freeze" on selling prices, it's worth while to note the economies that can be obtained through the use of bronze electrode welding in production, maintenance and repair. Service life of old and new parts can be increased; downtime reduced; scrap parts salvaged; reworking and finishing costs lowered.

SHEARING, forming and welding of stainless and mild steel at Lake Mills, Wis., plant of Creamery Package Mfg. Co.

Welded Stainless for Dairies

Efficient and sanitary equipment for the processing of milk and cream is made by welding stainless by the inert-gas arc. Next page shows interesting examples.

BY CLYDE B. CLASON

THE NEXT TIME you drink a glass of milk, spread butter on a roll, eat a cheese sandwich or enjoy a dish of fruit-flavored ice cream, think of what the dairy industry owes to welding! Most of these products-of-the cow wouldn't be so readily available to city dwellers if it were not for the development of highly efficient machinery, much of it constructed by welding.

FROM BUTTER TUBS TO . . .

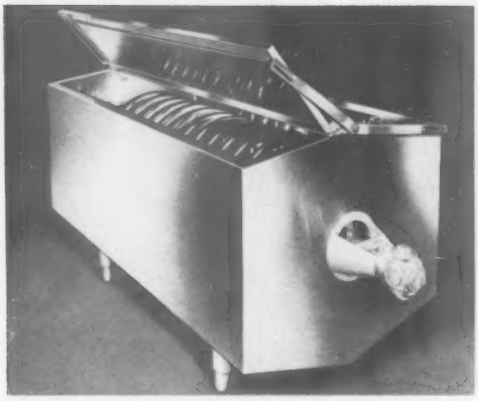
Pioneer in this development and a pioneer in the welding of stainless-steel dairy equipment is The Creamery Package Mfg. Co., Chicago. This 64-year-old concern was founded in 1887 by Charles Mortimer Gates, who served as its first president. Its business, as given by the original Illinois charter, was: "The manufacture and sale of butter tubs, cheese boxes and cooperage."

WHAT A DAIRY NEEDS TODAY

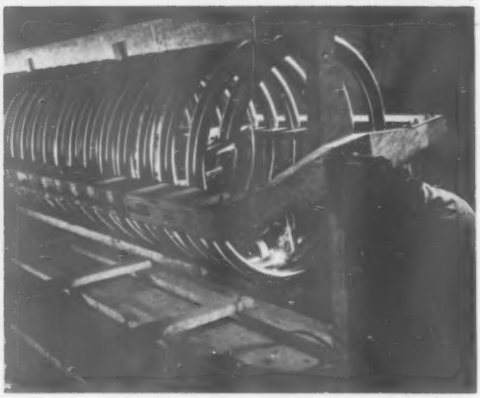
Today the company retains the name "Creamery Package" but has long since abandoned the manufacture of butter tubs. Its products, as listed in its 32-page special equipment catalog, include: weigh cans and receiving vats, milk bottle washers, multi-process tanks, pasteurizers, milk heaters, homogenizers, ice cream can fillers, ice cream mixing tanks, continuous ice cream freezers, feeders for feeding fruit to ice cream, cylindrical storage tanks, coil vats, batch freezers, compression refrigeration systems, cold-hold tanks with refrigerated walls, plate heat exchangers, churns, milk cans, rotary can washers and a vacuum filler for milk bottles.

The above products are made in one or another of five modern factories, which are located at Lake Mills and at Fort Atkinson, Wis.; at DeKalb and at Arlington Heights, Ill., and at Derby, Conn. The Lake Mills and Fort Atkinson plants are the largest of the five and are devoted entirely to the manufacture of processing equipment for dairy products. Lake Mills, where the bulk of the welding is done, has a most complete and up-to-date welding shop as well as its own foundry. Fort Atkinson does, for the most part, machining and final assembly work. DeKalb is devoted exclusively to the manufacture of ammonia compressors, condensers and other refrigerating machinery. Arlington Heights makes milk cans and dairy tinware. Derby manufactures can washers and other selected items of dairy equipment.

General and export offices are maintained at 1243 W. Washington Blvd., Chicago. A Canadian subsidi-



1—TOP PICTURES depict various stages in the manufacture of a coil vat for heating or cooling of cream



2—NINE BUTT WELDS are needed to join the sections of 2½-in. tubing into a single continuous coil

ary, Creamery Package Mfg. Co. of Canada, Ltd., is located in Toronto, and a British subsidiary, The Creamery Package Mfg. Company, Ltd., in Surrey, England.

Stainless the Dairy Metal

Because of its corrosion resistance, sanitation and the fact that it imparts no flavor to food products being processed, stainless steel is used in generous measure on dairy equipment. The advent of inert-arc welding has greatly facilitated the welding of stainless steel, as is evidenced by the accompanying "action" pictures taken at the Lake Mills plant.

Since it wouldn't be possible in the limited space at our disposal to discuss every welded product made by Creamery Package, we will concentrate on three examples: the "Wizard" coil vat, stainless-steel cylindrical storage tanks and a stainless plate heat exchanger.

The Wizard coil vat for the heating or cooling of milk or cream was first manufactured in 1904, when it was known as the Wizard agitator. Today coil vats bearing the name "Wizard" have come to be known as "the dairy industry's most useful machine." The modern Wizard (Fig. 1) has an all-steel welded body, a stainless-steel coil of 2½-in. tubing, corkboard insulation, automotive-type running-in-oil drive and a gleaming stainless lining and cover.

The Wizard's big stainless-steel coil is fabricated by butt welding together spirally coiled sections formed from 18-8 type 304 stainless tubing. This operation is shown in Fig. 2. Nine straight butt welds are made by means of inert-arc welding, using a 1/16-in. tungsten electrode and a 1/16-in. stainless-steel filler rod. Argon flow is 4 liters per minute; current (d-c) 60 amp. In addition to the butt welds made in the outer coil, around 50 inert-arc welds are made between the outer coil and the central shaft that supports and turns the coil in the vat.

Fabricating Big Sheets

The wrap sheets that form the sides and bottoms of the coil vats must also be fabricated by welding since it is not possible to secure single stainless sheets of the requisite dimensions. Sheet of 16-gage 18-8 type 304 stainless are butt welded together on a production basis by means of the track shown in Fig. 3. Sheets up to 144 in. long can be welded. The inert-arc torch is mounted on the carriage of a straight-line flame-cutting machine and travels at a speed of around 8 ipm. Again, direct current is used: 240 amp. Argon flow is 8 liters per minute, the electrode is a ⅛-in. tungsten, and no filler metal is added.

In Fig. 4, the two workers are removing the welded sheet. Note that two longitudinal butt welds had to be made to produce a single sheet of this width. The track on which the welding carriage runs is raised or lowered by means of a simple device operating on the principle of a screw press. A motor (shown at the far corner of the picture) turns the screws simultaneously at each corner post to lower or to raise the carriage track. Figure 4 also shows the clamping device to hold down the sheets. Levers spaced 8 in. apart are actuated simultaneously by compressed air in hoses on both sides of the I-beams that may be seen at the end of the track.

The automatic set-up pictured in Figs. 3 and 4 is also used to make butt welds in the cylinder sheets of stainless-steel horizontal storage tanks and vertical mixing tanks. Sheets big enough to make tanks up to 96 in. in diameter—over 300 in. long—can be produced by this automatic welding method.

Horizontal tanks for the storage of liquid dairy products are manufactured in capacities of from 1,000 to 5,000 gallons. Tanks of this type have a stainless-steel outer jacket and a stainless inner tank, with a 3 to 4 in. layer of cork insulation between the two cylinders. The contents may be kept continually mixed by means of a propeller-type agitator.

Fig. 5 shows an installation of two 1,000-gallon cylindrical storage tanks at the Kansas City Diced Ice Cream Co. Each of these tanks has an ID of 66 in., an OD of 70¼ in. and a length (less platform) of 86 in.

Plate Heat Exchanger

The third product to be described is the CP "Multi-Pass" plate heat exchanger. This machine is suited to heating, cooling, high-temperature short-time pasteurizing and regener-

3—STRAIGHT-LINE automatic welding joins sheets of 16-gage stainless

4—WORKERS REMOVE the stainless-steel sheet that was butt welded in picture 3. It will form the outer wrapper of the "Wizard" coil vat

ating. By regeneration is meant the exchange of Btu between two products, one of which is to be cooled and the other to be heated. As an example, cold milk is preheated before pasteurization by an exchange of Btu with hot pasteurized milk that has to be cooled to bottling temperature. Through this process of heat recovery, savings of as much as 75 to 80% of refrigeration and steam costs are possible.

How It Works

The basic heat exchange principle is simple: the milk or product to be processed flows on one side of the heat-exchange plate while the heating or cooling medium flows on the other side of the same plate to effect an exchange of heat. Heating can be by hot water or steam, while cooling can be by room-temperature water, chilled water or brine.

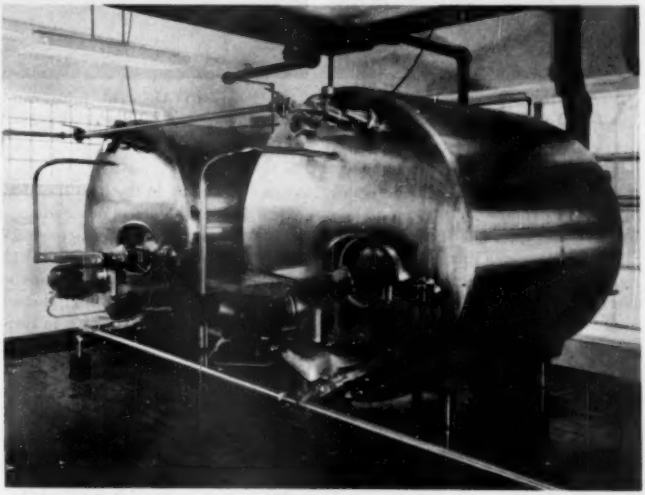
Milk, fruit or vegetable juices, wine, beer or any other free-flowing liquid can be processed in this type of heat exchanger. For dairies, it will handle the following eleven services:

1. High - temperature short - time (H.T.S.T.) pasteurization of market milk.
2. H.T.S.T. pasteurization of milk for cheese making.
3. Full-range heating or cooling of milk and cream.
4. Precooling of raw milk in receiving stations and processing plants.
5. Preheating of milk for separation.
6. Cooling skim or cream after separation.
7. H.T.S.T. pasteurization and cooling of coffee cream, table cream, whipping cream and churning cream.
8. Cooling ice cream mix after pasteurization.
9. Heating milk prior to evaporating or drying.
10. Cooling butter wash water.
11. Milk to milk regeneration.

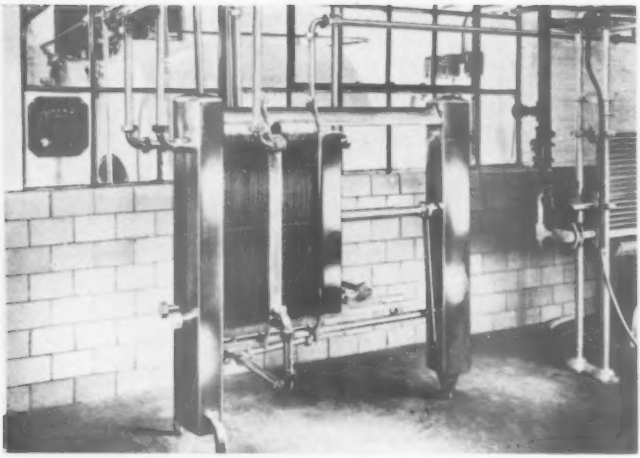
Plates Held by Press

This type of heat exchanger is furnished in a single press to cover a range of H.T.S.T. pasteurizer capacities from approximately 2,000 to 8,000 lb per hour. Every press has both a fixed and a movable head. Presses are available in two sizes: with a 24-in. maximum space for plates between the movable and the fixed head and with a 48-in. space between heads. By adding or removing plates, varied capacities can be obtained to accommodate changes in plant requirements.

The flat, smooth plates by which the heat exchange is effected are drawn from stainless sheet. The ends are cut to fit the triangular support beam at the top of the press and the locking bars at the bottom. There



5—STORAGE and mixing tanks are also made from butt-welded stainless sheets. These 1,000-gal tanks are owned by a Kansas City ice cream plant



6—CP "MULTI-PASS" plate heat exchanger at Richer Dairy, Columbus, O.

7—MAKING a vertical weld in outboard end of a heat exchanger.

8—HORIZONTAL weld joins cap to outboard end of heat exchanger

may be as many as 138 of these plates in a heat exchanger.

Each of the flat heat-exchange plates is separated by a gasket carrier, which has a series of shallow corrugations, pierced with smooth, round holes, running diagonally across the carrier for the purpose of creating maximum turbulence. The gasket carrier serves a triple purpose: (1) it insures leakproof, airtight flow circuits; (2) it provides the proper flow space between the heat-exchange plates; (3) it directs and controls the fluid travel across the plates in a turbulent, multipass pattern for increased efficiency in the heat transfer.

The heat-exchange plates and gasket carriers are of one-piece construction, but inert-arc welding is used to fabricate the intermediate terminals. These plates are made up of mild-steel ribs and edged sections, which in turn are completely sheathed in stainless steel. This is done by making straight butt welds completely around the edges, using the inert-arc torch without added filler metal. The pipe fittings and tubing on these plates are also intert-arc welded.

The inside of an exchanger of this type contains, in addition to the plates, very heavy mild-steel channels and other welded parts. The press consists of a solid, all-welded inner wall of heavy steel armored with a tight-fitting outer wall of welded and polished stainless steel. The seamless welded construction eliminates bolts and hard-to-clean joints.

Welding the Terminals

The same all-welded dual-wall construction (stainless steel over reinforced heavy mild steel) is used in the terminals. Terminal heads like the intermediate terminals on the press are all made with highly polished stainless-steel surfaces. Connections on the intermediate terminals are through polished stainless-steel ports. The terminals are designed so that no gaskets need be used in them, thus eliminating gasket grooves.

The movable terminals are supported by a triangular stainless-steel center beam and are provided with stainless-steel guides and a heavy-duty stainless-steel roller for horizontal movement. The press is equipped with an adjustable stainless-steel press jack to enable the plate-and-terminal assembly to be tightened. The tightening mechanism is wholly contained between the movable head and the rear press standard.

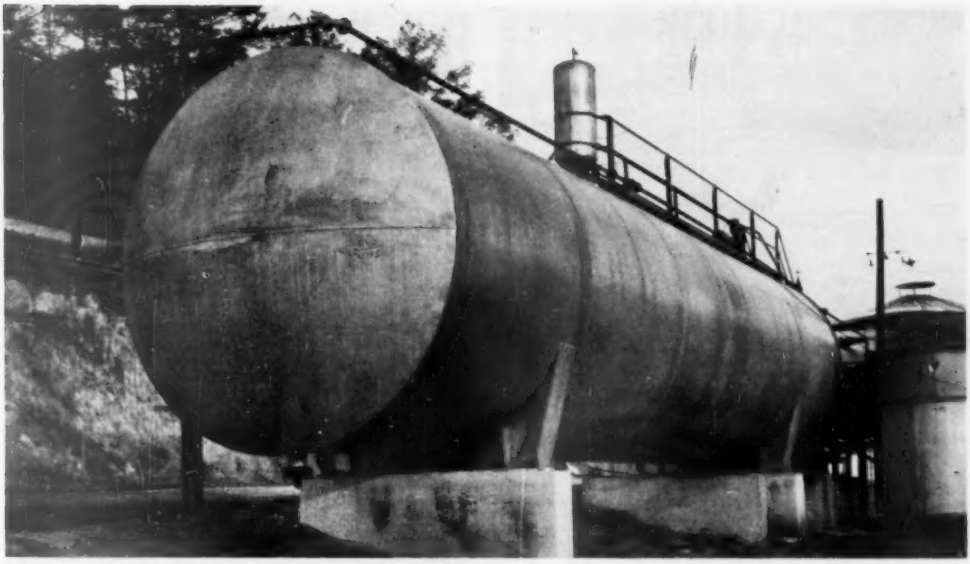
Altogether, 24 inert-arc welds are made in the framework of the heat exchanger. The mild-steel inner parts are completely sheathed in stainless by means of inert-arc welding.

The completed heat exchanger (Fig. 6) is 22 in. wide, 68¼ in. long and 60½ in. high. It weighs around 1,200 lb, which figure gives an idea of its solidity. The reason for such weight is that the plates have to be held together during the processing by very heavy pressures.

Figure 7 shows one of the two vertical welds that are made in the outboard end of the heat exchanger. The material is 16-gage 304 stainless. A straight butt weld is made without added metal. Electrode is a 1/16-in. tungsten; argon flow is 6 liters per minute; current setting (d-c) is 90 amp. The same welding data apply to the horizontal weld made to join the cap to the outboard end (Fig. 8).

* * *

Acknowledgment is made to the Linde Air Products Co. for help in compiling the welding details included in this article.



HORIZONTAL TANK was fabricated of 3S aluminum ⅜in. thick. It measures 50 ft long and is 12 ft in diam.

Tanks of Welded Aluminum*

The inert-gas arc welding process has greatly increased production of aluminum storage and pressure vessels. Here's the way they are being erected and welded.

BY PERRY C. ARNOLD

Welding Engineer,
Chicago Bridge & Iron Co.

I'D LIKE TO tell you the story of how several large aluminum storage vessels were erected and welded. Welding data, procedures and tables will not be given. Your attention, however, is called to the rather unique method used to erect some vessels. This erection and welding sequence was developed by the Chicago Bridge and Iron Co.

The picture on this page shows a 12 ft diameter by 50 ft long horizontal tank that was fabricated of 3S aluminum material of ⅜-in. thickness. This tank was completely fabricated in the shop and shipped out in one piece. It was necessary to stiffen the shell of the vessel with large internal girders because the liquid to be stored in it had a specific gravity of 1.38. The welding was done by the inert-gas-shielded arc method.

For another example, look at the pictures on page 30, detailing the fabrication of a 200,000-gallon tank erected to store hot ammonium nitrate. The material was 3S aluminum, and the inert-arc method of welding was again used. The tank is 35 ft in diameter by 28 ft high. The first ring of the vessel was 1.03 in. thick; the other rings gaged 0.78, 0.52 and 0.27 in. The center portion of the bottom was 3S material 3/16 in. thick, and the sketch plates were made of 5/16-in. plates.

The roof is an umbrella or self-supporting type made of 3/16-in. mild-steel plates. In order to prevent corrosion from occurring at the junction of the steel roof and the aluminum top angle, the two are separated by a rubber gasket. Steel and aluminum sections are held together with galvanized steel bolts and washers.

FROM THE ROOF DOWN

First step in construction was to assemble a temporary steel angle around the periphery of the foundation. The mild-steel roof plates were then blocked up and fitted to this angle. Fig. 1 shows how the roof plates were fitted together and to the temporary angle. The temporary angle assured a good fit when the roof was joined to the aluminum top angle of the tank. Note that the roof was erected and welded before the rest of the tank was built.

Fabrication was speeded by allowing work to be done on more than one portion of the tank at the same time. While the roof was being constructed, the aluminum bottom and first ring were being erected at a location adjacent to the foundation (Fig. 2). Both the roof and the aluminum ring were fitted together with the aid of patented key equipment.

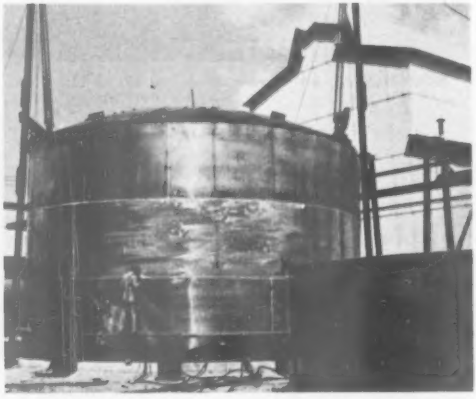
After the mild-steel roof was completely welded, it was raised high enough to allow the top ring of the tank to be assembled on the foundation directly beneath the roof. The top ring was assembled, welded and bolted to the roof plates. The entire assembly was then lifted to allow another ring to be assembled directly

*Abstract of paper delivered at twelfth annual Ohio State Welding Engineering Conference, April 13-14 at Columbus.

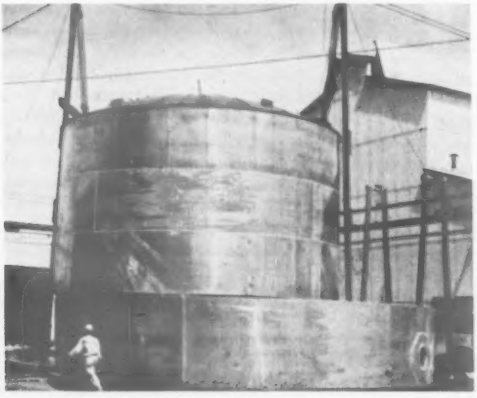
1—FIRST STEP: build the roof. It's of steel and will be separated from the aluminum by a rubber gasket

2—FIRST RING and bottom plates were assembled at another location while the roof was being constructed

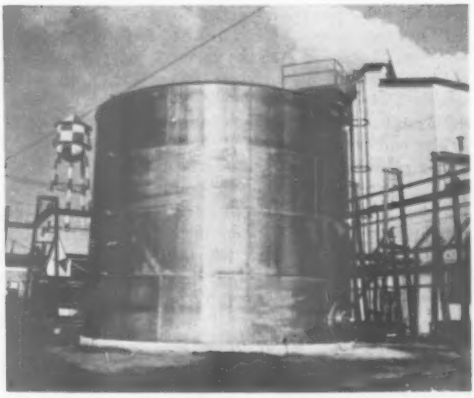
3—TOP TWO rings and roof are held high while the second ring from the bottom is assembled and welded



4—WELDING joint between second and third ring. At right, bottom-first-ring assembly waits to be added



5—BOTTOM and first ring are slid on rollers under the previously assembled upper portion of tank



6—COMPLETED aluminum tank (for storage of hot ammonium nitrate) is 35 ft in diameter by 28 ft high

beneath it. This scheme made it possible to do all of the erection and welding near the ground. Only a very small amount of scaffolding was required.

Fig. 3 shows the top two rings and roof being raised and held high while the second ring (from the bottom) is erected. As soon as the second ring is completely assembled, the upper assembly will be lowered and allowed to rest on it.

In Fig. 4, we see a weldor at work on the joint between the second and third ring. At the right the first ring has been assembled and welded to the bottom, and the unit is now ready to be slid under the larger assembled portion of the tank.

Fig. 5 shows the bottom-and-first-ring assembly being pulled under the rest of the tank. Rollers made it easier to move the bottom ring assembly onto the foundation. The completed tank appears in Fig. 6.

The Welding Details

Let's look at some of the details of this job. A standard make of transformer provided the welding current. A high-frequency current was superimposed upon the welding current to facilitate arc striking. Tungsten electrodes 3/16 and ¼ in. were used with filler rods of 2S bare aluminum in an atmosphere of argon gas. The filler rods were also 3/16 and ¼ in.

Aluminum plating of ¾ in. and over was preheated to about 600 F to speed up welding. The connection of the first ring to the bottom was a standard T-joint of the type customarily used in mild-steel tank construction. Trepanned specimens were taken from the welded joints as per API requirements. The specimens proved the weldments to be free of cracks and other defects. The primary stressed joints were back chipped to sound weld metal, doubly insuring full fusion and penetration. All joints in the shell proper were butt joints; lap joints were used in the bottom. All of the fittings and nozzles were installed in the field.

Only a few years ago this tank would have had to be welded by the oxyacetylene or oxyhydrogen process. Much greater warpage and distortion would have occurred. Because of the distortion, it would not have been possible to use the T-joint at the junction of the bottom and the first ring. The lap-welded bottom would have been equally impossible because of the corrosion that would have occurred between the plates from the electrode flux. Yes, the inert gas-shielded arc method of welding has contributed much to aluminum construction.

Other Processes Tried

Today, a variation of the inert-gas-shielded process is coming rapidly to the front. It utilizes a consumable electrode fed at a constant rate into the inert atmosphere. Much greater speed of welding is made possible with less distortion and warping. So far, however, the quality of the weldments has not been as good as when the tungsten arc is used.

In the past, several aluminum storage vessels have been erected using metal-arc welding with coated electrodes. This method produced weldments of good strength but very poor ductility. Also, the flux from the electrode coating had to be thoroughly washed from the material to avoid corrosion.

As another example of inert-arc welding, we erected six 30,000-gallon aluminum tanks for the storage of acetic acid. Each is 17 ft in diameter by 18 ft high. The material is 3S aluminum. Again, we used tungsten electrodes and bare filler rods of 2S aluminum. The arc torch (electrode holder) was water cooled, and during winter conditions it was necessary to add an antifreeze compound to the water supply.

Non-Heat-Treatable Alloys

So far I have described only the welding of the non-heat-treatable alloys. The heat-treatable alloys are now being welded with moderate to good success. Very recently, we erected and welded an aluminum floating roof of 61ST material in thicknesses ranging from 3/32 to ⅜ in. The welding was done with the inert-gas-shielded arc method, using alternating current with high frequency and an atmosphere of argon gas. Bare filler rods of type 43S aluminum were used.

It is true that heat-treatable aluminum alloys canot be welded without destroying some of the strength provided by the heat treatment. Experience shows, however, that the heat-affected zone will have a strength that is somewhat higher than the dead soft material though somewhat less than the heat-treated material. In other words, not all of the higher strength of the heat-treated alloy is lost because of welding.

In our experimental work with the inert-arc metal-arc welding, we have found that welds can be made on the high-strength heat-treatable alloys such as 52S without too much difficulty. This welding was considered practically an impossibility with the oxy-hydrogen and oxacetylene processes.

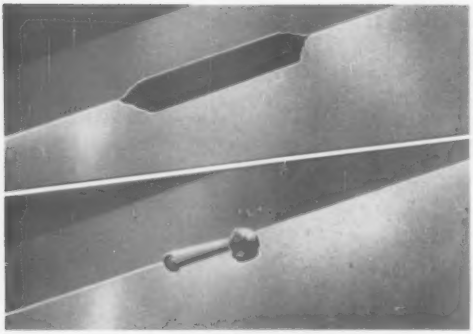
Still more progress will be made in the future in the fabrication and welding of aluminum and its alloys. Even now, fabricators are finding that a mixture of inert gases is beneficial to some types of weldments. They are close to eliminating the porosity problem, which has long been with us. Super cleaning of the plates and the electrodes also helps to end porosity.

Why It's Tricky to Weld

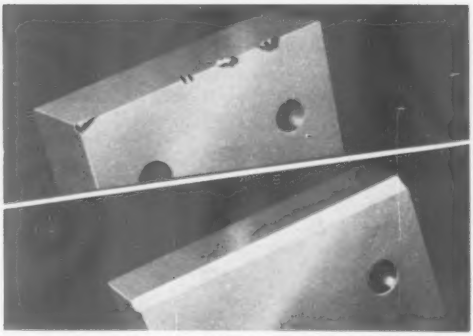
Aluminum has a coefficient of expansion approximately twice that of iron. Thus its greater distortion and warpage. The thermal conductivity of aluminum is many times greater than that of iron. Thus more heat input is required, resulting in more expansion and still more warpage and trouble. These and other factors must be recognized.

A heavy skin of aluminum oxide forms over a welding puddle. The melting point of the oxide is several degrees higher than that of the parent material. Thus there can't be any successful welding unless the oxide is fluxed out or removed before welding. Another source of difficulty: some of the alloys added to aluminum cause the material to become hot short. This tends to cause cracks as the material cools from welding temperature.

In spite of these inherent difficulties more progress has been made in the welding of aluminum in the last five years than was made in the previous twenty. The atomic age is going to force other rapid advancements. Tomorrow, perhaps, may bring about the introduction of a wholly new welding process for aluminum. Who knows?



GRINDING die edges to prepare for a partial repair



PREPARATION for a complete repair (entire new edge)

Die Welding

In this two-part article, Mr. Butler gives you everything but the skill necessary to weld tools and dies. This installment tells you the recommended procedures.

BY ARTHUR R. BUTLER
President, Welding Equipment and Supply Co., Detroit

Virtually all types of tool steel can be welded by the metal-arc method. You can rework damaged or discarded tools, salvage die units used for blanking, forming, forging, drawing, embossing, coining, hot and cold trimming, etc. In addition, you can fabricate composite units, using, for instance, a mild-steel base with tool-steel cutting edges.

Last month Arthur Butler discussed types of tool steels and the electrodes needed to weld them. He also covered the five factors that influence hardness: (a) preheating; (b) welding technique; (c) admixture of base metal with weld deposit; (d) rate of cooling; (e) tempering after welding.

In his second and final installment, Mr. Butler recommends procedures for the welding of tools and dies and for the composite fabrication of die units.—THE EDITORS.

TOOL AND DIE welding is neither mysterious nor complicated if you know what to do and follow the recommended procedure implicitly. The technique outlined herein is the result of twelve years of extensive research, development and practical experience in the tool-steel welding field. The basic principles incorporated should help to meet almost any tool and die welding problem.

RECOMMENDED SEQUENCE

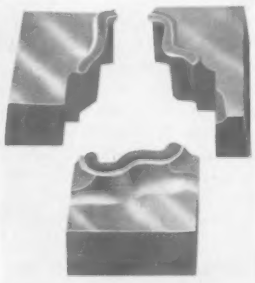
The recommended welding sequence breaks down into six steps:

1. Determine the Type of Tool Steel to Be Welded. Determination of the type of tool steel to be welded will apprise you of the heat treatment involved and will govern the subsequent handling of the unit in the welding sequence.

2. Select the Proper Electrode. In making partial repairs of cutting edges or working surfaces, select the electrode that will match, as closely as possible, the heat treatment of the metal to be welded.

In making full repairs to cutting edges or working surfaces, choose the electrode with characteristics best suited for the type of work the unit will have to do. Take into consideration any factors involving heat, abrasion, shock, thickness of metal to be cut or formed.

For repairing of forging dies or facing of cast or carbon-steel dies for drawing or forming, select alloy electrodes recommended for these purposes.



To Repair a Die

1 Determine the type of tool steel to be welded.

2 Choose the electrode having characteristics best suited to the type of work the die will do.

3 Rough grind the damaged areas. Grind deep enough to permit a weld deposit of 1/8 in. of finished metal for partial or 3/16 in. for a complete repair.

4 Preheat to recommended temperature (see text).

5 When applying electrode, overlap beads to eliminate craters and sear marks from cutting edges.

6 Temper the welded die by reheating it to the recommended temperature.

CRATERS and sear marks on cutting edges are eliminated by overlapping beads. Arrows show how weld should progress

by the Metal Arc--II

The size of the electrode to be used will depend on the width and depth of the damaged area. In general, a 3/32-in. electrode will repair a damaged area 3/32 in. wide and 3/32 in. deep. The same relation applies to the other electrode diameters. Always select the smallest electrode, especially for sharp cutting edges, because less volume of heat is required. There is also less chance of creating sear marks, and less grinding will be necessary after welding.

3. Prepare the Surface to Be Welded. In making partial repairs of cutting edges or working surfaces, rough grind damaged areas to allow for uniform depth of finished deposits of at least 1/8 in.

In making repairs to entire cutting edges of tools or dies, rough grind edges to be welded to an approximate 45-deg angle to allow deposits of 3/16 in. of finished metal.

On die units that require repairs over large areas, prepare surfaces so that finished deposits will be at least 1/8 in. deep.

In preparing for repairs to drawing and forming dies of cast structure, the edges or areas to be faced should be prepared uniformly so that finished deposits are at least 1/8 in. In preparing for extremely long deposits, for forming edges or over large areas on cast-iron base metal, staggering of studs every 1½ in. is advisable.

When preparing damaged forging die blocks for welding, areas to be repaired should be chipped, ground or machined as uniformly as possible to a finished depth of about 3/16 in. for the inlay deposit or, where necessary, to below the heat-checked depth.

4. Preheat. Your determination of the type of steel to be welded will apprise you of the draw range temperatures involved. Never preheat beyond the minimum nor exceed the maximum temperature of the draw range while welding. This is very important. Hardness will be lost if the unit is preheated to a temperature above the "draw range" because of disturbance to the original structure of the steel. Maintain temperature under minimum of the draw range in preheating and never above the maximum while welding. This will retain the original hardness of the steel.

The following temperatures are recommended for various "typical" tool steels:

Water-hardening (water or brine quench), 250-450 F.

Oil-hardening (oil quench), 300-400 F.

5% chromium air-hardening (oil or air quench), 300-400 F.

High-carbon, high-chromium air-hardening (air quench), 400-1,000 F.

High-carbon, high-chromium air-hardening (oil quench), 400-850 F.

Hot-working tungsten-chromium varieties, 1,050-1,200 F.

Hot-working chromium varieties, 900-1,100 F.

Molybdenum high-speed steel, 950-1,100 F.

Forging die blocks, 600-1,100 F.

5. Welding. Generally, d-c reverse polarity is used to apply tool-steel and alloy electrodes. However, they may also be applied with a-c.

Keep the temperature of the parent metal as uniform as possible during welding to assure uniform hardness of deposits. Never exceed the maximum temperature of the draw range of the metal being welded.

In welding cutting edges, position the work, if possible, so that the deposit will flow or roll over the cutting edges.

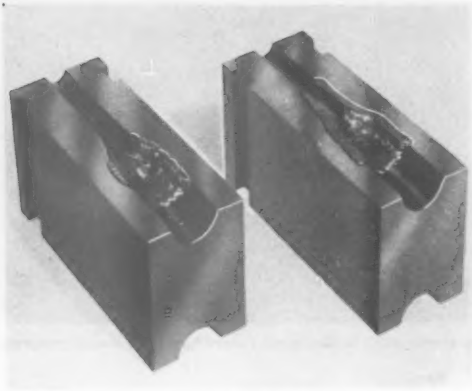
Always try to work slightly upward, as gravity causes the deposit to roll back and build up evenly. Gravity also causes slag to roll out of the crater and keep it clean. There is no need to weave the electrode in an intricate pattern.

In depositing beads, a slow travel is used to secure an even deposit and to assure more uniform fusion of the electrode with the base metal. Keep the area clean by frequent brushing.

Thoroughly peen all deposits to offset shrinkage and stress. Ball peen hammers are generally used, but small pneumatic hammers are efficient for large areas and inaccessible cavities.

It is important not to deposit excess metal in one pass. On final passes, retain beads as close as possible to finished size. This will eliminate excessive grinding.

When welding cutting edges, the arc should not be broken by rapidly pulling away the electrode. Eliminate deep craters and the searing of sharp edges adjacent to the weld area by lowering the electrode gradually as you stop welding.



SUIT electrodes to the work of the die. These hot upsetter dies were repaired with hot-work electrodes

ALLOY die welding electrodes were recommended for this typical repair made to restore worn forging die

Repair Welding of Dies . . .

When repairing parts of cutting edges, the welding bead should first progress in one direction to within a short distance of the other end; then it should progress in the opposite direction and overlap the first bead. This will eliminate craters and sear marks at the extreme end of the deposited metal.

In welding deeply damaged cutting edges (or drawing and forming surfaces), start at the bottom and gradually fill up the damaged areas. Use a slightly higher amperage on the first and second beads than on finishing beads. Peening while the weld metal is in the forging state also eliminates sear marks at the edges of the deposits.

If two or three dissimilar types of tool-steel electrodes are to be welded on one die unit, care must be exercised in applying the electrodes in sequence to their draw ranges; that is first electrode applied must have the highest draw range and so on to the electrode having the lowest draw range. This will prevent the annealing of previously applied deposits.

To effect repairs to entire cutting or forming edges of draw rings, female extrusion dies or similar circular parts, the skip-weld method should be used to insure even distribution of heat.

Warpage or distortion is offset by preheating to expand the units and by peening to stretch welded deposits and to offset stresses. These are mechanical problems. The use of shims and clamps is helpful. Peening will relieve the stress set up in the welding operation by stretching the deposited metal. Do not weld more than three lineal inches before peening.

6. Postheat or Temper Deposits or Sections. After welding, the units are allowed to cool approximately to room temperature and are then tempered by reheating to the recommended temperature. This is important as postheating serves as a tempering medium for the deposited metal. Reheating refines the grain structure and relieves stresses set up by welding.

In tempering deposits made to effect a partial repair, the general rule is to temper according to the draw-range temperature of the base metal. If units have been repaired over entire edges or working areas, temper the deposits according to the draw-range temperatures recommended for the electrode utilized. All welding units should be tempered or drawn to meet requirements.

To gage the proper tempering temperature, the minimum draw-range temperature should be employed on units for light-duty work. The maximum temperature of the draw range should be used on units for heavy-duty work. Also temperature within the range should depend on the size of the object. A small die will take the minimum temperature; a large one will take the maximum.

Secure heat-treating advice as to the length of time welded units should be drawn or tempered.

The preheating equipment may also be used for postheating, tempering or drawing. Use a controlled furnace if possible.

Composite Fabrication

Sometimes die units can be compositely fabricated. To a base of a mild, medium or high carbon steel (or an SAE steel) are applied water-hardening, oil-hardening, air-hardening, high-speed or hot-work tool-steel electrodes. The weld deposits are confined to cutting edges or working areas. The result is a fabricated composite die constructed mostly of inexpensive steel.

The same principles can be followed on drawing and forming dies that are cast structures or of carbon steel; simply deposit tool-steel alloy along sharp contours, belt lines and radii. This prolongs the life of the forming surfaces to better withstand abrasion, scoring or fouling.

Flame-hardening dies can be fabricated by using low-alloy electrodes.

Existing tool-steel units can be converted into composite ones to meet unusual conditions by welding a better grade of tool steel along the cutting edges or over working areas.

As deposits secured with tool-steel electrodes are "hard-as-welded," it is not necessary to subsequently heat-treat compositely fabricated units other than by tempering as recommended. To facilitate machining, however, the deposits can be annealed and

BASE of female trimmer is 1035 steel, while deposits of air-hardening tool steel constitute the cutting edges

COMPOSITELY FABRICATED draw ring is a blank of 1045 steel faced with tool-steel weld deposits

Composite Fabrication of Dies . . .

subsequently heat treated with the recommended heat treatment.

The recommended welding sequence is again in six steps:

1. Select the Type of Base Metal. When utilizing water-hardening, oil-hardening, air-hardening or high-speed steel electrodes, in composite fabrication, mild, medium, high carbon or SAE steels can be used as base materials. For composite construction of units for hot work, SAE steels of the nickel-chromium variety are recommended.

2. Select the Proper Electrode. Select the electrode with characteristics best suited for the type of work the dies will have to do. Take into full consideration any factors involving heat, abrasion, shock, thickness of metal to be cut, formed, etc.

The size of the electrode depends on the amount of metal to be deposited and the type of preparation. Always select the size that will efficiently create a cutting edge with a minimum of grinding or machining after welding.

3. Prepare the Surface. There are four types of cutting or forming edges to be utilized in composite construction: the angle type, the 90-deg shelf type, the straight-shelf type and the self-created land type. Except on the last type, grind edges or surfaces enough to allow at least a 3/16-in. finished deposit of metal. Choose the type of preparation most economical and suitable to the design of the unit.

In preparing for composite fabrication allow for two or more passes of the electrode. This will minimize the admixture of the electrode with the base metal and assure maximum uniform hardness "as-welded."

On units that must be covered over large areas, prepare the base metal surface so that finished deposits will be at least 3/16 in. deep.

In converting existing tool-steel units into composite ones, rough grind the edges to be welded to an approximate 45-deg angle to allow 3/16-in. deposits of finished metal.

Do not prepare units for composite fabrication to finish size. Make them oversize to allow for finish machining, drilling, etc., after the welding is completed. On ring type or circular units, oversize dimensions should be at least 1/8 in. to allow for finish grinding or machining to the actual dimensions.

Edges or areas to be faced should be prepared uniformly so that finished deposits are at least 1/8 in. Over extremely large areas of cast iron, staggering of studs is recommended and copper-nickel alloy electrodes should be used as intermediary electrodes. Nickel electrodes can also be used. In these cases, provision should be made in the preparation to allow for the additional deposits.

4. Preheat. A preheat of 200-400 F is recommended when using mild, medium or high carbon steel as a base. Smaller units will take the minimum of the preheat range and larger units the maximum.

When using SAE steels of the nickel-chromium varieties, a preheat of 600-700 F is recommended.

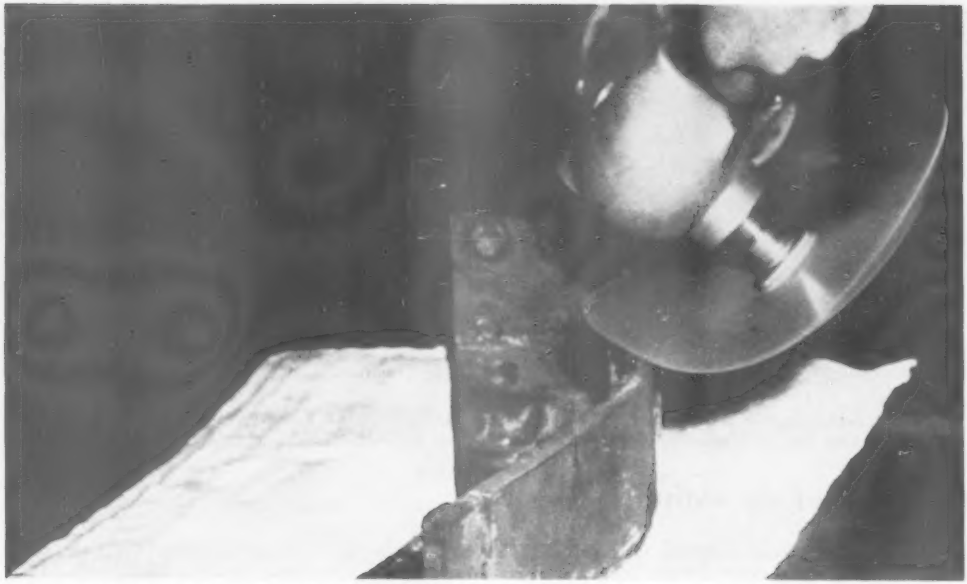
5. Welding. See step No. 5 under the repairing of tool-steel die units. The same procedures are recommended.

6. Postheat or Tempering. All welded units should be tempered or drawn to suit requirements. Units should soak at tempering temperature for a minimum of one hour. Tempering gives toughness with very little depreciation of hardness, refines grain structures and relieves stresses and strains set up in welding operations.

On compositely constructed units, tempering should always favor the deposited metal. The base metal acts only as a retaining medium for the cutting or working edge of the desired tool steel. For the recommended tempering temperatures of deposits in composite fabrication, refer to manufacturer's information on each electrode.

When existing tool-steel units have been converted into composite units, the tempering should always favor the deposited metal and not the base metal.

All possible means to eliminate or minimize down-time and maintenance costs are being earnestly considered nowadays. A suggested expedient is Tool and Die Welding, which can be used profitably in any plant with tools and dies.



1—FLEXIBILITY of the disc holder is tested to the extreme in this finishing operation on a structural steel shape

Adhesive Abrasive Discs

Speed of replacement, flexibility in following irregular contours are among the benefits of a new line of adhesive-backed abrasive discs up to 20-in. diameter.

BY D. M. WETHERALD
The Metal Removal Co., Chicago

A NEIGHBORHOOD barber shop figures in a new way to grind off excess weld metal!

The barber shop enters the picture through the medium of a Chicago tool engineer, who was one day sitting in it awaiting his turn for a haircut. While he waited, he watched. The barber was massaging another customer's face with a rubber disc attached to a flexible-shaft machine. Noting how easily the rubber pad followed the varied contours of the chin and neck, the idea struck our tool engineer that an abrasive surface on a rotating flexible disc could likewise be made to follow the contours of an irregular object—say, for instance, a die block.

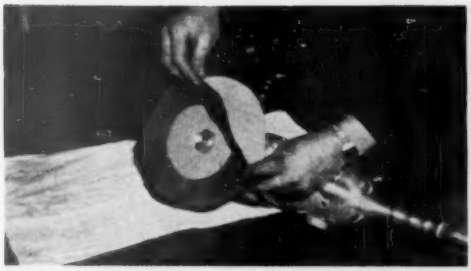
First, though, it was necessary to work out a way to fasten an abrasive sheet to a flexible backing. Pressure-sensitive adhesives seemed to offer the best answer since they can be applied and removed numerous times without affecting either the adhesive itself or the backing. Material for the pad or holder wasn't as easy as it seemed. Rubber, the obvious material, proved to be too flexible for discs of larger diameters; it is today being used only for discs under 3 in. Nevertheless, all of these problems were successfully solved.

Today, a complete line of adhesives, abrasive sheets and flexible back-up disc holders offers interesting possibilities to tool and die makers, welding job shops and others who are compelled to grind odd-shaped weldments.

The extreme flexibility and durability of the disc holder shows up clearly in Fig. 1. The disc that looks so badly bent is grinding down a weld on a structural steel shape. This holder is 9 in. in diameter and 1/32 in. thick and is turning at 4,200 rpm. Disc holders of heavier weight are also available.

Quick mounting is another advantage of the new discs. It is amazing how speedily used discs can be removed from the holder and replacement discs or discs of different grit sizes can be substituted. To put on an adhesive-backed disc, the operator merely places it on the holder and presses on it to make flat contact against the pad (Fig. 2). Removal is just as simple—a fingernail under the edge of the disc loosens it, and it is easily peeled off (Fig. 3).

How such discs are used with a portable grinder is shown in Fig. 4. This 3-in. disc is turning at 22,000 rpm to grind a tool-steel weld deposit on a die punch. In Fig. 5, the flexible disc produces a fine feather edge while grinding the surface of a large die block of CSM No. 2 steel. These two die grinding pictures were taken at the Atomoweld Co., Chicago,



2—APPLYING adhesive-backed abrasive to the holder

3—PEELING off disc is as simple as putting it on

4—GRINDING DIE with 3-in. flexible abrasive disc

5—A 9-IN. DISC gives feather finish to die block

Aid Weld Grinding

an organization of die-welding specialists.

Doesn't Get Stuck up

Packaging and storing of the discs is a problem that was anticipated in the manufacture of the adhesive. For instance, you'd think that a pile of abrasive cloths coated on one side with a sticky substance would be one gummy mass and mess after several days of storage. However, it's neither. The special adhesive is snobbish and sticks only to the disc holder and to the cloth backing. The grits in the next sheet aren't affected at all.

Fine-grit abrasives offer a demonstration of the unusual adhering power of this adhesive. With no bonding between disc and holder, a fine-grit - and - light - cloth combination would gather in ripples and tucks, finally tearing and destroying the disc. Now, the disc sticks smoothly and permanently all around the backing. Disc life is increased by 35%, according to test results.

Customers can buy a complete variety of disc diameters and grit sizes in discs. There are 15 grit sizes ranging from No. 16 to 400. Abrasive cloth is cut to circular shapes from ½-in. diameter for small dies to 20-in. diameter for structural welds and castings.

To utilize fully the idea of adhesive discs, the manufacturer had to develop unique disc holders. These holders are made from a canvas base impregnated with a phenolic resin. A 5/8-11 aluminum bushing mounted in the center of the holder (Fig. 6) will fit most standard grinders. An advantage of the bushing design is the flush mounting on the grinding side to prevent nicking or scratching of the workpiece. If needed, bushings of different diameter or different thread specifications can be ordered.

New applications of the adhesive-backed abrasives are turning up daily. One company making ball bearings wants to mount them by adhesives inside a large grinder. Meanwhile, their utility in the weld shop has been well demonstrated.

6—DISC HOLDER'S metal bushing is flush-mounted on grinding side to avoid unwanted scratches. It will fit most standard grinders

AVIATION students learn oxyacetylene welding by doing work on aircraft tubing

INSTRUCTOR Charles Meinhart explains the procedure for making a welded repair on above defective case for a bulldozer transmission

Training 'Blue-Collar'

Practical welding program at "Cal Poly" turns out men immediately fitted for jobs in industry. Students learn by doing and earn while they are learning.

BY GRANT BALL

Student at California State Polytechnic College

WHILE most colleges are busy training people away from jobs that require manual skill, one college —the California State Polytechnic College—frankly admits that it is turning out "blue-collar" workers. This 50-year-old California educational institution at San Luis Obispo trains practical men for practical jobs in a score of specialized fields in engineering and agriculture.

With a special welding department headed by Professor Richard C. Wiley, the college has developed a realistic approach to the problem of carrying out a broad welding engineering program for almost half of its 2,700 men students. A well-equipped shop is provided.

The main shop building of 40 by 100 ft houses a welding engineering laboratory, an office, an experimental testing laboratory and a shop area. Connected buildings are occupied by a tool room, a stock room and a locker room. Two acetylene generators of a combined 450-lb carbide capacity are housed in a separate building.

Gas and Arc Equipment

The main instruction shop is equipped with 30 oxyacetylene welding stations having both light aircraft-type torches and heavy-duty, all-purpose welding torches. Individual regulators for pressure adjustment accommodate each station. The arc-welding section has fourteen stations separated from the rest of the shop by a flash screen. The ventilation system was designed and built by Cal Poly welding students.

Other equipment includes: an atomic-hydrogen arc welder; a 75-kva air-operated and electronically controlled resistance welder; 1,200-lb and 2,500-lb variable-speed welding positioners; a 300-amp gasoline-driven portable arc welder; a 150-ton hydraulic press used for physical testing and to do hot and cold forming; an inert-gas-shielded arc welder using both d-c and a-c high-frequency current; and an automatic submerged-arc welding head. Minor shop equipment is also well provided.

The welding engineering laboratory is equipped with several large drafting tables, a number of drafting machines, a metallurgical microscope, a specimen-mounting press and polishing wheels, an electric furnace, a Rockwell hardness testing machine, a contact pyrometer and other laboratory apparatus and supplies.

Future plans for welding equipment call for the addition of a flame-cutting machine with two or more cutting torches in order to give practice in the mass-production of parts from heavy steel plate.

The welding department now owns a 110-kv X-ray machine, donated to it by a local hospital. In view of the low capacity of this medical type X-ray, the department is limited in non-destructive tests to material not exceeding 3/16-in thickness. This machine would not be very useful in an industrial plant, but it does help welding students to gain knowledge and practice in the use of X-rays for weld inspection.

Cal Poly's project system enables the students to "learn by doing" and "earn while learning." A variety of repair and fabrication projects gives students experience from cost estimating to job supervision and actual

DRAFTING is essential because after the first year most work includes weldment design. Professor Wiley is supervising this class

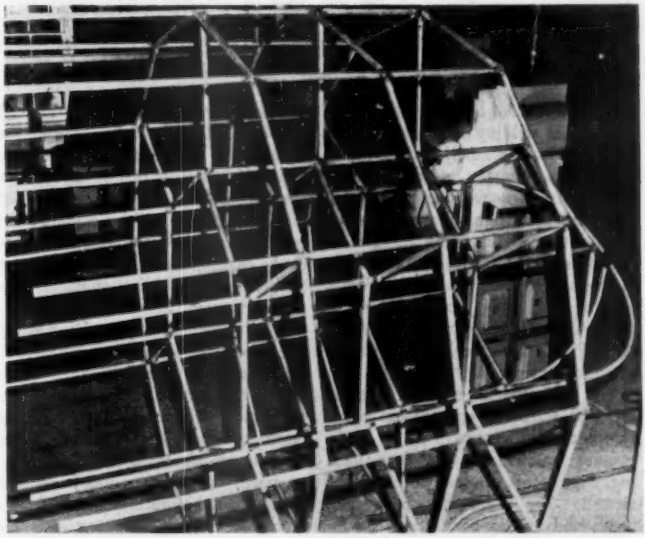
THESIS PROJECT: the construction of a submerged-arc welder from used parts

Workers

practice in welding on the job.

One of these projects, completed last year, was a baseball backstop built of 4-in. and 6-in. pipes. An advanced welding student was assigned as project engineer to oversee the subassemblies, make cost estimates and supervise the final assembly on the baseball field. Under the project engineer's direction, six students carried out the welding and rigging necessary for the job.

Student weldors were also used to complete a milk conveyor project, which involved the remodeling and installation of a gravity conveyor system approximately 200 ft long. The conveyor was needed to handle the cases of bottled milk at the college dairy. The job consisted of fabricating two 90-deg turns, supporting members, guard rails and other miscellaneous parts. The conveyor has had a year of successful operation.



"JUNGLE-JIM" above is the schoolyard's substitute for the old apple tree. The welding student seems lost in the maze of pipes. The project was paid for by a local service club for installation on a school ground

A war-surplus motor grader, built by the army for a special purpose, was obtained by Cal Poly after the war. The grader was one of very few built, and parts were not available. In particular, no replacement could be found for the missing flywheel housing casting: the manufacturer had destroyed the pattern. He was, however, able to furnish the school with a blueprint of the original cast part. From this, the welding department redesigned the part for a welded housing. The grader is now back in operation.

Farm Students Taught to Weld

Agriculture and industry are the two main divisions at California Polytechnic College. The agricultural division operates a 3,700-acre ranch, completely stocked and equipped with the latest farm machinery from corn pickers to post-hole diggers. The welding department repairs and fabricates all the school's farm equipment. Comments Wiley: "We don't want Cal Poly's farm students to become baling wire mechanics."

Many welding projects are undertaken in the two-year program for agricultural engineering students. The final quarter consists of work in the

HYDRAULIC PRESS for guided-bend tests was built by welding department students as a thesis project

DEMONSTRATING new automatic shape-cutter. Stand, table and bin for the machine were made by students

welding engineering laboratory dealing with cost estimating and simple design. Tractor trailers, portable arc-welding rigs (increasing in use on farms because of electrification) and other accessories to farm machinery are built to combine both practice and theory.

After a student has taken the basic courses in welding, he branches off into his special field. If he is, say, an aeronautics student, he takes a two-year oxyacetylene welding course concentrated upon light alloy-steel tubular construction as found in aircraft fuselages. The fourth, fifth, and sixth quarters deal with advanced aircraft welding, including work with alloy-steel tubing, aluminum and stainless steel. Problems in resistance welding are also considered.

The Poly students in air conditioning and refrigeration take up more complex welding problems in their two-year course in oxyacetylene welding. Pipe joints are laid out and fabricated: 7's, reducers, orange-peel heads and branch connections in various diameters of pipe. All these projects are tested to 2,000 psi.

It is the mechanical engineering majors at Cal Poly who will be most likely to take their welding experience into industry. An especially comprehensive welding program is given to them. First come three quarters of fundamental arc-welding courses similar to those taken by the agricultural students. With this foundation completed, the mechanical engineering students do laboratory work in dealing with problems of cost estimating, simple design, design of welded joints, etc. Various welding codes such as the API-ASME code for unfired pressure vessels are also studied. The fourth-year program for ME students consists of machine design solely from the welding viewpoint.

Help Each Other

The various departments at Cal Poly are inter-related by working on each other's equipment. For example, the electrical engineering department installs, maintains and repairs all electrical equipment on the campus; recently it installed a 75-kva air-operated, electronic-controlled resistance welder in the welding shop. As another example, the mechanical engineering students operate a Diesel-electric generating plant that supplies part of the college's electricity.

The welding student at Cal Poly has to be given a background sufficient to learn the practical and theoretical welding problems. The welding department sets up prerequisite courses for students before they can enroll in advanced welding. Drafting is essential because after the first year most of the work produced is in the form of the design of weldments. The mechanical engineering course, Strength of Materials, is required because without it no student could successfully understand the fundamentals of design problems. College math courses are also required.

For welding students who have completed regular courses, Special Problems courses are given to go further into the various fields of welding. Students are put on their own to design a project. Complete specifications and cost estimates are required, and the actual job can then be done if time and shop space permit. For instance, an agricultural engineering student designed and fabricated a special hay baling trailer that is now being used on ranches near Cal Poly. The trailer was designed to follow the hay baler and receive about fifteen bales, which it dumps at specified loading spots. Instead of having to gather scattered bales from all over the fields, ranchers can now pick them up at convenient locations. The welding department at Cal Poly likes to encourage this sort of problem-solving on the job.

Contacts with Industry

The field trip is one of the most effective ways of bringing welding students into close contact with industrial plants. Trips are made through steel mills, foundries, steel fabrication plants, etc. The students also are shown industrial films that will help them to understand the various welding processes, and attendance is encouraged at technical meetings such as those which the AWS presents.

"Most students who take welding at Cal Poly are not expected to become expert weldors," says Wiley. "We want agricultural and engineering students to understand the fundamentals of welding. We want them to understand and appreciate its uses, importance and limitations when they go into their respective fields. But there is a place for the welding engineer, and the student with three years of mechanical engineering background can become a welding specialist at Cal Poly."

Big Week of Welding

Week of May 6 in Cleveland was the setting for seventh annual convention of the National Welding Supply Association, quarterly board of directors' meeting of the American Welding Society and the twelfth annual Welding Symposium of the Cleveland section of AWS.

BY T. B. JEFFERSON

WITH 240 registrations from all over the United States, the seventh yearly convention of the National Welding Supply Association was the best attended one yet. Its technical and entertainment program was also above par, and the contact booth exhibitors benefited from the excellent setting afforded by the Hotel Statler ballroom.

NWSA directors held a meeting on Sunday afternoon, but the real activities of the convention did not begin until Monday morning, May 7, when President Glenn G. Garman, of Purity Cylinder Gases, Inc., Grand Rapids, Mich., called the meeting to order.

Secretary Robert C. Fernley reported the highlights of the year's activities. These included six zone meetings, every one of which was attended by National President Garman. In the remainder of his report, the Secretary described the many ways in which the association is endeavoring to serve its members. "We urge you to regard the association as another department of your business," he invited, "and refer to us any troublesome matters. Our office has developed many sources of information and a know-how for handling members' problems."

Still Selling to Be Done

In the annual address of the president, Mr. Garman outlined the problems confronting today's welding distributor. "Despite the fact that we seem to be in a sellers' market," he said, "there is still a job of selling to be done by the welding supply distributor. Unless the distributor's salesmen wake up to this fact, they will find that business is disappearing."

The president also reminded the members of the difficulties in doing business in an economy that is half at peace and half at war. Scarcities, shortages and substitutions are the major problems facing the industry.

Speaking on "The Outlook for Business," Merle Hostetler, manager of the research department, Federal Reserve Bank, Cleveland, said that the business outlook was good for the foreseeable future. However, the business man must keep on his toes and continue to do a selling job so that he won't forget how to sell if there should be a curtailment in the present mobilization program. If the activities of a company are based upon a continued selling program, it will have little to worry about as a result of industrial fluctuation.

Third speaker on the Monday morning program was H. F. White, Jr., of Booz, Allen & Hamilton, Chicago, a firm specializing in business surveys. Mr. White's "Time Out for Self Appraisal" was a thought-provoking talk.

Questions for Self-Analysis

In twenty questions, Mr. White attempted to show how the problems of a welding distributor can be analyzed. Half of the questions were devoted to sales control; the remainder to customer relations and management control.

Some of the questions Mr. White said that distributors should ask themselves regarding their sales activities were:

Do you have a balanced line? Does every item stand on its own feet? Are your sales territories right? Are they too large or too small? Is your sales force underpowered? Are salesmen developing territories?

In the field of customer relations, a few questions were:

Are you providing good shop service? Are you overemphasizing customers' needs for unusual emergency costs? Is your credit policy driving away sales or building bad debts? Do profits justify investment?

Conscientious answers to the questions in these two fields should certainly help a distributor to determine whether or not he is doing a job in his location.

An informal luncheon was followed by a contact booth program Monday afternoon, also continued on Tuesday afternoon. The contact booths were generally more accessible and more pleasingly arranged than last year. There were some 28 associate members who held exhibits or otherwise participated in the contact-booth activities.

While the men were busy with meeting activities, their ladies were entertained with a luncheon, bridge and Canasta party on Monday and a tour of the Cleveland Museum of Art on Tuesday.

Panel Discussion

The Tuesday morning session was a timely and lively panel discussion of the present supply situation. The seven panel members also answered questions regarding priorities, allotments and other problems affecting today's welding market. President Garman acted as moderator. Panel men, all associate members, were:

A. C. Gilbert, Jackson Products, Warren, Mich.; James E. Norcross, Arcos Corp., Philadelphia; R. H. Newton, Lincoln Electric Co., Cleveland; V. H. Godfrey, Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.; Harold E. Piggott, Dockson Corp., Detroit; Fred Jessar, Aljay Mfg. Co., Inc., Philadelphia; and Bent Laune, All-State Welding Alloys Co., White Plains, N. Y.

After the panel discussion, John R. Bromell, wholesale specialist, distribution and service trades division, Office of Civilian Requirements, National Production Authority, interpreted the meanings of some of the NPA orders in the light of their effect upon the welding industry.

New Officers

To clear the decks to allow the incoming president to preside over the annual convention dinner, the 1951-52 officers were elected on Tuesday morning. There were no nominees other than the nominating committee's official slate, presented by its chairman,

Robert S. Mars, of Duluth, a past-president of the association.

R. S. McCracken, of R. S. McCracken & Sons, Inc., Philadelphia, is the new president of the National Welding Supply Association. The six regional vice-presidents are:

Eastern zone: R. C. Waldie, manager, welding department, Williams & Co., Inc., Pittsburgh.

Southeastern zone: W. A. Rice, president, Virginia Welding Supply Co., Charleston, West Va.

Southwestern zone: Charles O. Stilwell, partner, Gulf Welding Equipment Co., New Orleans, La.

Central zone: R. P. Tarbell, president, Scott-Tarbell, Inc., Cleveland.

West central zone: R. T. Rogers, president, R & R Welding Supply Co., Des Moines, Ia.

Western zone: G. Milton Sims, Absco Welding Supplies, Los Angeles.

Directors: James C. Dawes, of the James C. Dawes Co., Martins Ferry, O., was elected a director to fill the unexpired two-year term vacated by Mr. Tarbell on his elevation to the vice-presidency. Four directors were elected with terms expiring in 1954. They are:

Joseph A. Cunningham, president, J. A. Cunningham Equipment, Inc., Philadelphia, for the eastern zone.

Leslie P. Beaver, Jr., owner Beaver Welding Supply Co., Memphis, Tenn., for the southeastern zone.

Allen H. Young, president, Independent Distributing Co., St. Joseph, Mo., for the west central zone.

L. J. Weisgerber, owner Mankato Welding Supply Co., Mankato, Minn., for the west central zone.

Confusion Confounded

Early Tuesday evening, the members, their wives and their guests met with the new officers in a cocktail party in the Pine Room of the hotel. Shortly afterward, they adjourned to the ballroom for an informal dinner. Speaker of the evening was Edward McFaul, of Chicago, whose subject was "How Confused Can You Get?"

Mr. McFaul kept the audience in stitches for over an hour, and his speech was a tonic for these troubled times. He pointed out that fear and worry are the main causes of the confused situation confronting the world today. However, most of our worries are about little things, and life is too short to take them seriously. Those who attended the NWSA banquet went away feeling a lot better.

Wednesday's activities included five presentations by active distributors, three of whom are among the newly elected vice-presidents of the association. Topics were:

"Steps Our Organization Is Taking to Live with the Priority System," by G. Milton Sims, Absco Welding Supplies, Los Angeles; "How We Are Meeting Customer Requirements during a Period of Shortages," by R. P. Tarbell, Scott-Tarbell, Inc., Cleveland; "Problems of Management which Face the Distributor," by Harry Johnson, Wayne Welding Supply Co., Inc., Fort Wayne, Ind.; "Cost and Value of a Catalogue," by W. A. Rice, Virginia Welding Supply Co., Charleston, West Va.; "How We Store and Distribute Manufacturers' Sales Literature," by A. H. Homrighaus, Jr., Welder Service Co., Toledo, O.

Among the final business, Chairman R. S. McCracken of the Resolutions Committee offered five resolutions for members to vote on. First was a resolution to thank manufacturers in the welding field who included in their advertising a statement that their product was sold through distributors. This was approved as were the resolutions to give a vote of thanks to the outside speakers during the convention and to give Glenn Garman a vote of appreciation for his year of service as president. The remaining two resolutions were messages of sympathy for relatives of two members who had passed on during the year: M. R. Semmer, of Weber-Semmer Co., Pittsburgh, and Paul J. Weinberg, of Photologue Publishing Co., Chicago.

Three new members were voted into the association. They are: Welding and Cutting Supply Co., Cleveland; Cottet's Welding Supply Co., Syracuse, N. Y.; and California Alloy Products Co., Los Angeles.

In behalf of the association, R. S. Mars presented to the retiring president, Glenn Garman, an engraved sterling silver pitcher.

The eighth annual convention of NWSA will be in Chicago next May.

Welding Symposium

The second of the welding events that took place in Cleveland the week of May 6 was the annual Welding Symposium of the Cleveland Section of AWS. This all-day affair, held at the Allerton Hotel on Friday, was a complete success from any point-of-view. It included educational exhibits by suppliers and users of welding in the Cleveland area, which were on display in the morning. The technical sessions were in the afternoon. Lew Gilbert, editor of *Industry and Welding*, served as technical chairman.

The first speaker was James Hyslop, president of Hanna Coal Co., St. Clairsville, O., speaking on the subject of "Maintenance Welding around the Clock." Mr. Hyslop emphasized that welded fabrication of machine elements subject to high working stresses and abrasion minimized time-out for breakdowns and maintenance. An example is the company's large shovels, which operate three shifts per day, seven days a week. Mechanical maintenance necessitated only 7% downtime.

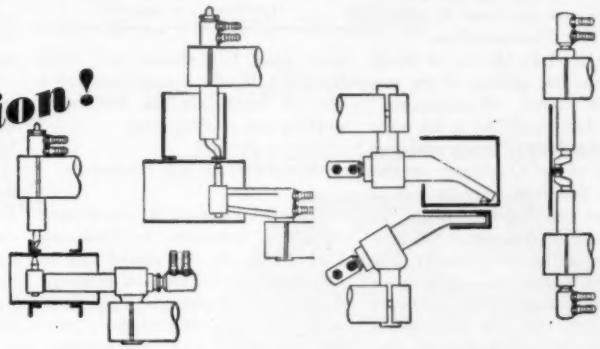
Don Kleckner, shop superintendent for the Hanna Coal Co., supplemented Mr. Hyslop's paper with slides on actual applications of welding for maintenance purposes at the mine. He also gave pertinent information regarding wear life, abrasion-resisting characteristics etc. of a number of different types of hard-facing materials used for the maintenance of earth-moving machines, bulldozers, trucks, drills and other mine equipment.

Ross Yarrow, Republic Structural Iron Works, Cleveland, presented a concise but excellent paper covering the field of structural fabrication. He discussed design and also included information on templates, layout, punching, fitting, welding, inspection and erection. Bring the AISC manual up-to-date with data on welded connections, size of material, amount of weld metal and the allowable loads permissible, advocated Mr. Yarrow, so that engineers and designers can have authoritative information on structural welding.

"New Developments in Inert-Arc and Resistance Welding," particularly as they are applied in the manufacture of steel pipe, were discussed by Sherman Heald, Republic Steel Corp.

The main event of the day was the annual dinner. On this occasion, it was dedicated to A. E. Gibson, president, of Wellman Engineering Co., Cleveland. Mr. Gibson, past chairman of the Cleveland Section and president of the AWS for the 1936-37 term,

Value Beyond Expectation!



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Bench Welder Holders
Paddle Type Holders
Universal Holders
Low Inertia Holders
Close Coupled Holders
Seam Welder Wheels
Seam Welder Shafts and Bushings
Elkonite Rod, Bars and Inserts
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Welding Materials

had long played an important part in the activities of the Cleveland section. The toastmaster was Louis B. Seltzer, editor of *The Cleveland Press*.

Senator Karl E. Mundt, of South Dakota, was the speaker of the evening; his topic: "Americanism." Mundt is fully qualified to say what Americanism is not, having served as a member of the Committee on Un-American Activities when he was in the House of Representatives. In pointing out the dangers of the communist threat to this country, the Senator made some fun-loving passes at his colleagues and others prominent in Washington life. As an example, the Senator remarked that anyone, politician or otherwise, is overcome with a feeling of importance as soon as he gets inside the city limits of Washington, D. C.

"Take the Washington cab drivers," said Mundt. "They are equipped with a vast fund of misinformation. They are willing to share it. You may as well listen to the cab drivers, though. They are the only people in Washington who will answer a question with any degree of finality."

Presidents are pretty important too, Mundt added. While there have not been very many during his fourteen years in Washington, all that the speaker had known believed they should have a life-term lease on the White House.

"Senators," said the Senator, "are very important people. You can't find one of us who will deny it. We modestly refer to ourselves as members of the most exclusive club in the world. Do you realize that all senators shave themselves with exceeding care? They feel that they may be shaving the face of the next President of the United States."

"All in all, though," Mundt concluded, "we are not such bad guys. Just average people doing the best we can. We sent two of our boys in Congress to the federal penitentiary and one to the White House. We have them moving both ways, and some people think we've sent some of them in the wrong direction."

One of the country's foremost speakers, Senator Mundt held the crowd of over 600 people spellbound for an hour and a half. All who heard him left with a clearer feeling regarding the menace of communism and the need for a continued fight to maintain our individual freedom.

IAA GOES TO MONTREAL

(Continued from page 19)

man, John F. Callahan and Herb Reinhard. If ever a group merited a vote of thanks, it was this hard-working and efficient gang.

New Officers and Directors

The official slate of the nominating committee, announced by Chairman J. J. Lincoln, Jr., was passed without a dissenting voice. The new president is James W. Dunham, vice-president of the National Cylinder Gas Co., who had served as IAA vice-president during the 1950-51 term.

F. W. Hench, president, American Oxygen Service Corp., Harrison, N. J., was elected vice-president, and E. V. David, assistant manager of the technical sales division, Air Reduction Sales Co., New York City, was re-elected treasurer. Naturally, H. F. Reinhard was re-elected secretary.

Three directors had terms expiring. Robert B. Swope, president of Southern Oxygen Co., Inc., Washington, D. C., was re-elected to succeed himself. Past-President C. E. Monlux was elected a director to succeed Henry Booth; Victor G. Bartram, of Shawinigan Chemicals, Ltd., a director to succeed C. McL. Pitts.

A morning and an afternoon session of technical discussion were on the agenda. Dr. H. S. Sutherland, vice-president, Shawinigan Chemicals, Ltd., Montreal, was chairman of the morning session, held immediately after the business meeting. The single paper, on "Problems of Transporting Acetylene through High- and Low-Pressure Pipe Lines," was given by W. G. Fogg, executive engineer, research and engineering department, Air Reduction Co., New York.

C. McL. Pitts, president, The Peoples Gas Supply Co., Ltd., Ottawa, was chairman of the afternoon discussion session. Again only one paper was given: "What Is Behind the Dissolved Acetylene Regulations?" by Lionel Dimitri, chief engineer (production) L'Air Liquide Society, Montreal.

IAA members fortunate enough to be able to stay over for the third day can look back upon a delightful trip. About a hundred took advantage of the kind offer of Shawinigan Chemicals, Ltd., to visit its plant at Shawinigan Falls, Que. The Canadian Pacific Railway provided a special train that reached Shawinigan Falls shortly after lunch. The visitors were met by buses and were taken out to the carbide division for a plant tour.

The raw materials, coal and limestone, are converted to coke and lime in specially designed furnaces and huge revolving kilns, along which the visitors walked on a catwalk in a temperature that couldn't have been under 120 F. They also saw the huge carbon electrodes for the carbide furnaces being made from special coal imported from Wales. These electrodes are giant cylinders measuring 40 to 50 in. in diameter by about 30 ft long. Three of them are needed in each of the six furnaces. About 3 ft of the material from each electrode is consumed in a day.

The coke-lime mixture is converted into calcium carbide under the terrific heat generated by the huge electrodes arcing between each other and between the molten carbide pool. A current of 40,000 to 80,000 amp is used, with no more than 160 volts.

When the furnaces are tapped, the white-hot carbide at a temperature of 3,500 F gives off a light that makes the mid-summer sun look pale. Tapping is done by carbon electrodes 4 in. in diameter, through which are fed the thousands of amperes of the furnace current. A wall of solidified carbide about 15 in. thick is pierced in five minutes. The molten mass then flows out and is caught by cast-iron pots. An average day's production is on the order of 650 tons.

Shawinigan generates acetylene by both the conventional wet generators and by so-called "dry" generators. In the latter, the amount of water that is admitted to the carbide is controlled by the temperature of the output gas.

From the carbide plant, the visitors were taken on a brief tour of the city and through one of the several hydro-electric plants owned by the Shawinigan Water and Power Co. They were then brought to the City Hall, where they met another mayor.

Most cordial greetings on behalf of the municipality were extended by His Worship François Roy. From City Hall, the visitors were taken to the Cascade Inn for an hour of cocktails and good fellowship and were brought back to the station just in time to catch their special train to Montreal.

It was a grand convention!

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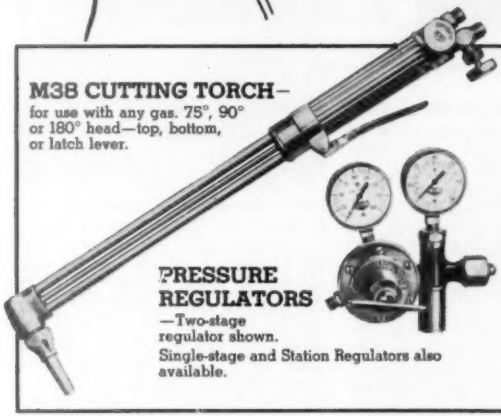

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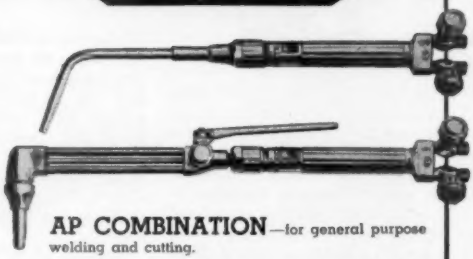

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FLUX CRUSHER reclaims fused submerged arc flux to save time, money

Hand Spot Welder Joins Metal Foil

ON-THE-JOB repair and fabrication of Inconel and stainless steel foil and screen can be accomplished with a new portable spot welder. Known as the "Hit-Kit", it was developed to handle metal insulating blankets.

To weld, both electrodes are placed on the foil surface in such a position to make a bond when current flows between them. Operation is by a trigger switch on one electrode holder. Leads to the holders are 9 ft long. The power cabinet is connected to a 110-volt outlet. Foil thicknesses up to 0.004 in. and screen wire diameters up to 0.020 in. can be securely welded.

Complete welder including power cabinet fits in a 20 by 10 by 8 in. steel box with a lift-out tray. Special foil and wire tools come with the standard kit.

THE H. I. THOMPSON CO., 1733 Cordova St., Los Angeles 7.

* * *

Replaceable Electrode Cap Saves Spot Welding Costs

A SMALL replaceable cap fits a new Mallory spot-welding electrode and is the only part that wears out. When cap goes, you just put a "Nu-Wrinkle" cap on the same shank. A corrugated skirt provides positive electrical and thermal contact with the shank. A fluted water hole in the shank assures maximum cooling efficiency. Design of the cap skirt and shank socket provides positive alignment.

Because of its unique design, the Mallory "Nu-Wrinkle Cap" electrode is a readily replaceable insert for resistance welding dies. It is available in all standard Mallory nose shapes in Elkaloy A and Mallory 3 metals.

P. R. MALLORY & CO., INC., 3029 East Washington St., Indianapolis 6, Ind.

* * *

Silver Coated Strip Betters Brazed Joints

LOW-CARBON steel strip precoated with silver-brazing alloy is claimed to make uniformly high quality brazed joints. It eliminates the preplacing of silver-alloy strips and accompanying failures due to slipping, balling-up of the melted alloy and inclusion of flux. Called "Braze-clad," the strip is available in all thicknesses down to 0.005 in. and in any width up to 4 in., coated on one or both sides. It is also available in copper, brass, nickel-silver, beryllium-copper and nickel.

AMERICAN SILVER CO., INC., 36-07 Prince St., Flushing, N. Y.

Small Crusher Recovers Fused Welding Flux

CONSIDERABLE savings in submerged-arc welding operations can be realized with the use of a small crusher to reduce the fused un-used flux to proper size again. The Holmes 7 x 6 in. laboratory sample crusher has handled as much as 530 lb of small size flux per hour and 308 lb of large size flux per hour. Size of the crushed small flux was as follows: plus 8 mesh, 9%; 8 to 80 mesh, 86% and minus 80 mesh, 5%. It can thus be seen that a high percentage of the reclaimed flux fits within recommendations for new flux.

By recovering such a high percentage of fused flux, the cost of the crusher plus its low maintenance is soon offset. Considering that welding flux is highly abrasive, maintenance of rotor hammers in the crusher is quite simple. The crushing hammers are made of cast manganese steel, and the screen plate can be easily replaced when it is worn.

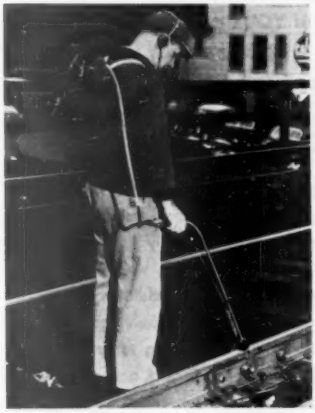
Maintenance costs are lower if nuts, bolts, nails, electrode tips, etc., are kept from the flux during handling. If such foreign matter is present to a serious degree, some type of magnetic separator should be used.

Companies using these crushers and reporting satisfactory results include a large railway car manufacturer, a shipbuilding firm, etc.

ROBERT HOLMES & BROS., INC., 510 Junction Ave., Danville, Ill.

for welding

Running short of welding materials? Try some new replaceable spot welding tips or a new crusher for reclaiming fused welding flux!



Ultrasonic Flaw Detector Tests Welded Steel

A NEW weld testing apparatus indicates imperfections or breaks in welds by means of generated sound waves. Called the "Audigage Flaw Detector," the entire outfit is housed in a canvas carrying case and weighs 12 lb.

Ultrasonic resonance is set up in the joint by an X-cut quartz crystal transducer. A good weld causes resonance at a frequency reflected in a 1,000 cycle per second tone in the operator's headphones; a crack or other flaw causes a distinctly different tone.

Continuous joints can be checked easily by sliding the transducer head along the surface—a wear plate protects the transducer proper. Company claims as many as 800 to 1,000 test locations per day can be checked.

BRANSON INSTRUMENTS, INC., 430 Fairfield Ave., Stamford, Conn.

* * *

New Welding Rod For Dirty Cast Iron

A NEW low-temperature welding rod for welding dirty, rusty or oil-soaked cast iron has the product name "N.P.A." Deposit is not as machinable as a nickel-core rod for cast-iron welding, but the rod can be used as a primer or sealer rod, especially in dirty or rusty spots, says manufacturer.

PERMALATEM WELDING ALLOYS CORP., Neptune, N. J.

* * *

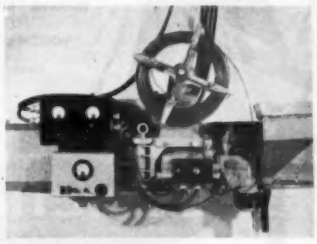
New Electrode Holder Has Upright Jaws

NEWEST thing in electrode holders is a "Cam-Lok" model having upright jaws. This is said to eliminate rod bending and to aid in welding in cramped spaces. Loading trigger is operable with one hand, without fumbling, says the company.

There are no coil springs in the operating mechanism, which is completely enclosed in a tough, laminated insulation. The holder is available for immediate shipment in three sizes: 200, 300 and 500 amp capacities.

CAM-LOK DIVISION, EMPIRE PRODUCTS, INC., P. O. Box 9813, Cincinnati 36, O.

* * *



High Speed Welder Makes Straight Seams

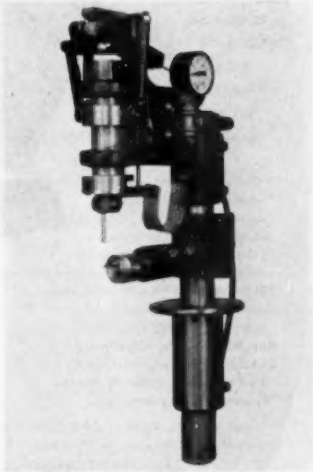
UNIFORM welding of straight-line seams in light to heavy plate can be done at high speed with the new UE-48 submerged-arc welder. The speed range is 3 to 200 ipm. It is recommended for permanent production installations.

The complete machine consists of Linde's CM-48 side beam carriage, a UE welding head, a small rod reel, a flux feed hopper and controls. The rate of speed can be pre-set by a meter so that when the carriage moves it will be according to specification. Speed rate can be changed while the carriage is in motion.

Steel plates from 16-gage to 1½-in. thick can be welded with a single pass. The head can be positioned at right angles to the track.

LINDE AIR PRODUCTS CO., 30 East 42nd St., New York City 17.

* * *



Tiny Spot Welding Head Welds Radio Tubes

NEW Model I-S "Weldpower" spot-welding head uses either ⅛ or ¼ in. electrodes for welding radio and electronic tubes. It is a press-type welder with single post mounting. Accurate electrode pressure is maintained through the use of a closed air system utilizing a metal bellows.

A simple electrode clamp makes changing fast and easy. The lower electrode mounts either horizontally or vertically. Opening between the faces of the holders is adjustable from 1 to 4 in., making possible the use of relatively large jigs.

RAYTHEON MFG. CO., 190 Willow St., Waltham 54, Mass.

(Continued on Page 86)

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—AND SCORES MORE . . . INCLUDING sketches and data on welding alloys for use with: cast iron, all steels, stainless steel, copper, brass, bronze, nickel and its alloys, magnesium, aluminum, hard and machinable overlays, etc., etc., etc.!

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Non-Ferrous Electrode Specifications and Properties

Type	Classification	Composition %	Mechanical Properties: Tensile, Strength, Psi	Yield Strength, Psi	Elong. in 2 in., %	Brinell Hardness
Aluminum, AWS–ASTM B184–43T						
Aluminum	Al-2	Cu 0.2; Fe 0.6; Mg 0.05; Mn 0.05; Si 0.5; Zn 0.05; Ti 0.03; Ni 0.03; Al 99.0	12,000	5,000	35	23*
Aluminum 5% Silicon	Al-43	Cu 0.4; Fe 0.8; Si 4.5 to 6.0; Mg 0.05; Mn 0.3; Zn 0.2; Ti 0.2; Al remainder	14,000	9,000	40	40*
Copper and Copper Alloys, AWS–ASTM B225–48T						
Copper	E Cu	Cu 99.0; P 0.3	25,000	—	20	—
Phosphor Bronze Grade A	E Cu Sn A	Sn 5.0; P 0.3; Remainder Cu	40,000	20,000	15	70-85*
Phosphor Bronze Grade C	E Cu Sn C	Sn 8.0; P 0.3	45,000	25,000	12	85-100*
Copper Nickel	E Cu Ni	Ni 30.0; Cu 70.0	45,000	25,000	25	—
Silicon Bronze	E Cu Si	Si 3.0; Cu 94.0	40,000	20,000	20	80-100*
Aluminum Bronze	E Cu Al A	Al 8.5; Fe 1.0 Remainder Cu	65,000	30,000	15	140**
Aluminum Bronze	E Cu Al B	Al 9.5; Fe 4.0 Remainder Cu	70,000	35,000	10	160**
Aluminum Bronze	E Cu Al C	Al 10.5; Fe 4.0 Remainder Cu	75,000	40,000	4	200**
Aluminum Bronze	E Cu Al D	Al 11.5; Fe 4.0 Remainder Cu	65,000	45,000	—	250**
Aluminum Bronze	E Cu Al E	Al 12.5; Fe 4.0 Remainder Cu	70,000	50,000	—	300**
Corrosion-Resisting Chromium and Chromium-Nickel, AWS–ASTM A298–48T						
Austenitic Stainless Steels	E 308	C 0.08; Cr 19.0; Ni 9.0; Mn 2.50; Si 0.75; P 0.030; S 0.030	80,000	35,000	35	200**
	E 309	C 0.15; Cr 22.0; Ni 12.0; Mn 2.50; Si 0.75; P 0.030; S 0.030	80,000	35,000	35	200**
	E 310	C 0.20; Cr 25.0; Ni 20.0; Mn 2.50; Si 0.75; P 0.030; S 0.030	80,000	35,000	30	180**
	E 316	C 0.08; Cr 17.0; Ni 11.0; Mo 1.75 to 2.50; Mn 2.50; Si 0.75; P 0.030; S 0.030	80,000	35,000	30	180**
	E 317	C 0.08; Cr 18.0; Ni 12.0; Mo 3.00 to 4.00; Mn 2.50; Si 0.75; P 0.030; S 0.030	80,000	35,000	30	200**
	E 330	C 0.25; Cr 14.0; Ni 33.0; Mn 2.50; Si 0.75; P 0.030; S 0.030	75,000	30,000	25	200**
	E 347	C 0.08; Cr 18.0; Ni 9.0; Cb 10 X C, 1.20 max.; Mn 2.50; Si 0.80; P 0.030; S 0.030	80,000	35,000	30	200**
Hardenable Chrome Steels	E 410	C 0.12; Cr 11.0; Ni 0.60; Mn 0.60; Si 0.75; P 0.030; S 0.030	70,000	35,000	20	200**
	E 502	C 0.10; Cr 4.0 to 6.0; Ni 0.40; Mo 0.45 to 0.65; Mn 0.75; Si 0.75; P 0.030; S 0.030	60,000	30,000	20	200**
Non-hardenable Stainless Steel	E 430	C 0.10; Cr 15.0; Ni 0.60; Mn 0.75; Si 0.75; P 0.030; S 0.030	70,000	35,000	20	200**

*500-kg load. **3,000-kg load.

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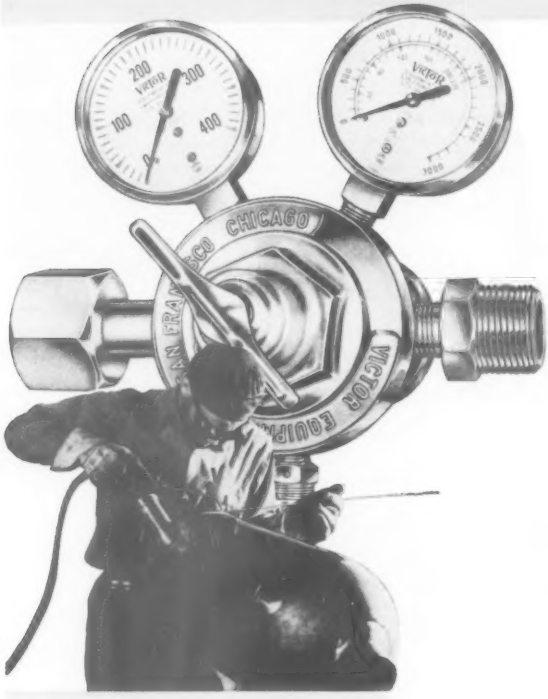

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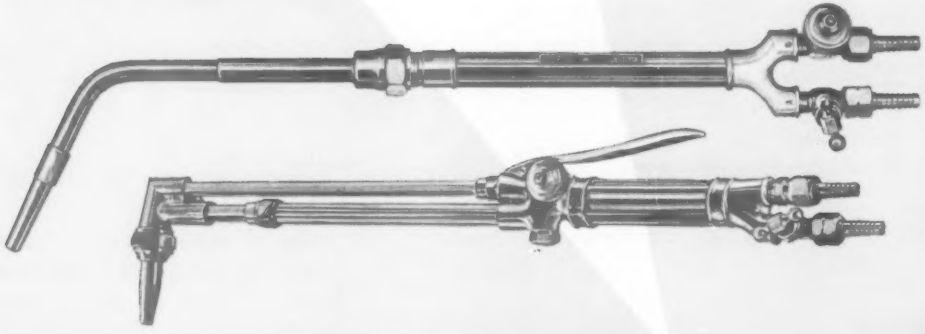

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A Welding Engineer Reader Service

1 WELDING LENSES—Willson Products, Inc., Reading, Pa. 4-page bulletin describes and illustrates a wide range of eye protective equipment for both gas and arc welding. It includes information about the "Weld-Aid" lens for bifocal wearing weldors and other eye comfort accessories.

2 GAS WELDING CATALOG—Weldit, Inc., Detroit 6. Large, two-color catalog gives the gas weldor a complete selection of cutting and welding torches, regulators, "Gas-saver" units, complete welding outfits and spare parts. All equipment is pictured and explained in clear presentations.

3 ACETYLENE PLANTS—The Sight Feed Generator Co., West Alexandria, O. 6-page folder gives the layouts and equipment provided for complete acetylene producing plants in 240 to 3,000 cu ft per hour capacities. Use of the Sight Feed Model A-Twin acetylene generator, key component of the plant, is clearly explained.

4 CONTACT ELECTRODES—R. I. Mendels, Inc., New York City 17. 4-page, two-color folder tells about Norelco contact electrodes having steel powder in their coatings. Welding procedure, current settings and applications are given for two types. Pictures and graphs illustrate text.

5 POWER BRAKES—Dreis & Krump Mfg. Co., Chicago 36. 12-page catalog P-51 includes the complete line of power bending, universal box and pan brakes. Motor drives, clamping methods and handling times are discussed and illustrated in clear photos. Catalog includes many pictures of bends and different models of special and hand brakes.

6 TUBE NOTCHING TOOL—Vogel Tool and Die Corp., Melrose Park, Ill. 4-page bulletin describes the "Arc-Fit" process of notching tubing and piping with the Vogel patented shear housing and dies. Various shape notches are illustrated as well as ways to use the shear housing in power and hand presses.

7 WELDING FITTINGS—Taylor Forge & Pipe Works, Chicago 90. Handsome, 44-page, thumb-indexed catalog No. 501 gives a complete listing of nozzles, welding necks and large diameter flanges. Clear photos and diagrams show each fitting and many tables give data on pressure, physical characteristics and operating facts.

8 LOW TEMPERATURE ALLOYS—Eutectic Welding Alloys Corp., Flushing, N. Y. New edition of 6-page folder contains specifications on 100 Low Temperature Welding Alloys used in welding, brazing, hard-facing and cutting. Folder opens to 11 by 25-in. chart for wall mounting. A page of welding applications and alloys recommended for each is included.

THE WELDING ENGINEER will request manufacturers to send readers the literature in which they are interested. Two post cards are printed here, each containing space for four items.

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9 PLATE RECTIFIER WELDER—Miller Electric Mfg. Co., Appleton, Wis. New bulletin describes three new models of selenium rectifier arc welders. Design, operating characteristics and other features are included.

10 WELDING POSITIONER—The Pandjiris Weldment Co., St. Louis 10, Mo. Single-sheet bulletin tells about the Model 30MVRMT positioner having a 1½-ton capacity. Bulletin describes work table rotation, protection on overtravel, rotating drive, tilt and tilting drive as well as push-button stations and gearing.

11 OPTICAL PARTS—Bausch & Lomb Optical Co., Rochester 2, N. Y. 14-page catalog L-117 includes information about lenses, prisms, reflectors and engravings and coatings for various microscopes, signals and instruments. Catalog numbers, focal lengths and dimensions are listed for most parts.

12 CAST-MONEL—The Cooper Alloy Foundry Co., Hillside 5, N. J. 8-page reprint from *Iron Age* contains information on the production, and handling of cast Monel parts. Weldability, machinability and corrosion resistance are concisely and clearly reviewed. Author is Norman S. Mott, Cooper's chief chemist and metallurgist.

13 CONTROL VALVES—Hanna Engineering Works, Chicago 22. 16-page catalog tells about foot, hand and pilot operated valves as well as speed control valves and control circuits for air and hydraulic systems in resistance welders, machine tools, etc.

14 WELDING ACCESSORIES—J. M. Ragle Industries, Kansas City 4, Mo. 18-page catalog describes the "Commando" line of tip drill kits, lighters, lighter chains, cover glasses, soapstone holders, positioners and weldor's soap. There are 5 pages of tip cleaning data for all standard makes of torches.

15 ELECTRODE HOLDER—Erico Products, Inc., Cleveland 3. Catalog sheets describe the new "Caddy" electrode holder, the new "Cadweld" process for joining cable and new design ground clamps. All items are diagrammed and their operating principles explained.

16 SILVER BRAZING—All-State Welding Alloys Co., Inc., White Plains, N. Y. 4-page folder describes three specially packaged low-temperature brazing compounds and fluxes used for small or infrequent joining jobs.

17 WROUGHT IRON—A. M. Byers Co., Pittsburgh, Pa. 4-page bulletin gives most frequently required data on wrought iron pipe such as areas, circumference, length per sq ft of surface, gallons per lineal foot, chemical compositions, properties, radiant heating conversion figures.

18 SPOT WELDING ALUMINUM—Reynolds Metals Co., Louisville 1, Ky. 4-page copy of Reynolds' "Technical Advisor No. 15" tells about "slope control" for spot welding aluminum with consistent good results. Article includes explanation of oscillograph curves and density, force and current settings.

19 METAL CLEANING — American Wheelabrator and Equipment Corp., Mishawaka, Ind. 28-page catalog 724 tells about the blast cleaning of automotive and railroad equipment, tubing and soil pipe, steel drums, sanitary ware and asphalt tile.

20 LOWER WELDING COSTS—The Lincoln Electric Co., Cleveland 1. 6-page reprint from *Iron Age* entitled "21 Ways to Lower Arc Welding Costs" discusses material, design, welding joints, production, electrode sizes, etc., that help the engineer cut welding costs.

21 ELECTRODE HOLDERS—Tweco Products Co., Wichita 1, Kansas. 4-page bulletin CP-51 gives a clear picture of such Tweco products as electrode holders, ground clamps, cable connectors, cable splicers, lugs and lug-attaching kits. All items are described and their prices given.

22 WELDING RESEARCH—Brown Boveri & Co., Baden, Switzerland. 14-page booklet gives excellent review of Brown Boveri testing and research on spot and seam welding of various metals. Pictures show labs, machines, oscillographs, welding equipment and control cabinets.

23 STUD WELDING—KSM Products, Inc., Merchantville, N. J. 8-page, two-color booklet gives useful information on stud welding applications and also data on various size KSM special and standard studs. Photos show various uses.

24 LOW PRESSURE CYLINDERS—Hanna Engineering Works, Chicago 22. 20-page, two-color catalog No. 236 gives operating pressures, construction data, cutaway diagrams, specifications and other information on Hanna cylinders for use on resistance welders, positioners, etc.

25 SILVER BRAZING — All-State Welding Alloys Co., Inc., White Plains, N. Y. Miniature folder tells the six "dos" and the two "don'ts" of sound silver brazing procedure. It is published to help in the materials shortage.

THE WELDING ENGINEER will request manufacturers to send readers the literature in which they are interested. Two post cards are printed here, each containing space for four items.

These cards not good after October 1, 1951

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THE WELDING ENGINEER, JULY, 1951

We Mobilize for Freedom

WHY
Controls are Necessary

One of the encouraging characteristics of the American people is their dislike for government controls. This augurs well for the future of their economic and political freedom.

But for the next few years we must not only tolerate but also help to make effective a whole battery of emergency government controls over our economic life. If we fail to do this now the future of that freedom we cherish will be imperilled. It is the purpose of this editorial—the third in a special series—to explain in simple terms why this is so.

After our military victory in World War II, we rushed through a demobilization which cut our military strength to about one-tenth of its wartime peak. Our allies did much the same thing. But the Russians maintained much of their wartime military strength and built up that of their satellites. With prodigious speed we switched from military to civilian production and went on to enjoy a rousing postwar boom—the greatest in our history.

This boom was in vigorous progress when, on June 25 last year, the Russian-sponsored North Korean army attacked South Korea. Our industrial production was rolling along at almost twice its prewar level. We had labor shortages in many key industrial areas. Under the impact of heavy buying all along the line, prices were climbing.

When the North Koreans smashed into South Korea they smashed into our national consciousness this fact: if we want a fair chance to save our national freedom from destruction by Communist aggression, we must race to restore some of the military power we had so speedily written off after World War II. And we must do it with our resources already very fully occupied with a boom in civilian business.

Program Small Compared to World War II

Compared with our military effort in World War II, the mobilization on which we are now embarked is small. At its peak, under present schedules, it will absorb no more than one-fifth of the total national production. During World War II we reached a point when nearly half of our total production went for war-making.

Moreover, our economy now is much bigger and stronger than it was in World War II. During the last decade there has been an increase of about 15 percent in our labor force. Our workers have had the training advantage of steady employment. The capacity of our industrial establishment is two-thirds again as great as it was ten years ago. Since the war no less than $70 billion has been spent to expand and modernize it.

Given time, the industrial giant we have created could pick up in its stride the added load of production for defense that now is con-

templated. But speed is of the very essence. There is little dissent from the proposition that if we are to stand off Russian aggression successfully we have, at the outside, two years in which to get ready.

Controls Needed to Prevent Chaos

These two facts – (1) the necessity for speed in our rearmament program and (2) an economy already stretched taut by a record civilian boom–create the general necessity for government controls. If we simply pile the billions of added defense expenditures authorized since last June on top of the civilian boom, and let it go at that, two destructive developments would follow. There would be a scramble for scarce materials, notably metals, which would create chaos in those markets. And prices would go through the roof.

Our situation during this mobilization is radically different from what it was when we rushed to get ready for World War II. Then we started with an economy that was coming out of a long depression. There was plenty of slack. Even in mid-1941 we still had over 6 million unemployed. Thus it was possible for us to expand war production greatly and also increase civilian living standards before the limits of our productive capacity made extensive controls necessary. But as we begin this new mobilization we find our economy already operating virtually at capacity. This fact is of key importance in understanding why this relatively small defense program so quickly requires the imposition of controls.

The selection and administration of controls thus far has been badly bungled. The threat of price controls, for example, was broadcast so vigorously and for so long that our people were virtually asked to raise prices and thereby do much to defeat the controls. Adequate taxation directed so as to attack inflation at the source and thus give direct price control a chance to operate has not yet been provided.

Indeed, we could readily assemble a long and devastating catalog of the deficiencies of the government's control program. But that would not dispose of the necessity for controls – by priority, by allocation, and, as a stop-gap, by direct prescription of selling prices – if we are to carry out our mobilization successfully. That is the only means by which a clear right of way for defense production can be cut through the highways of trade and commerce now jammed with civilian boom business.

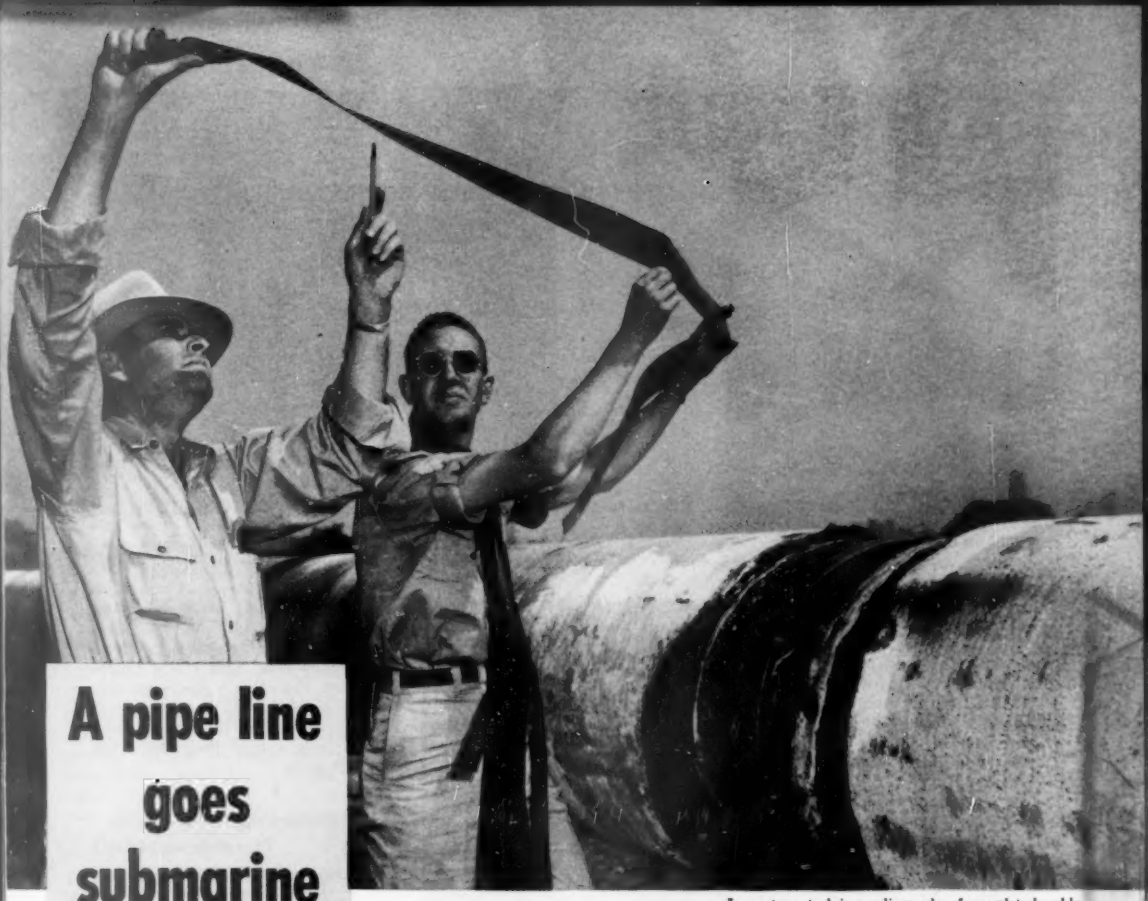
Hope In The Wilson Plan

Since he became Director of Mobilization, Charles E. Wilson has added a new element of order and hopefulness to the mobilization program. He has laid out a plan which, if we are spared all-out war, would do three things by 1953. First, it would produce the weapons needed by our army and our allies to meet an immediate threat. Second, it would create the capacity that would enable us to move at high speed into weapons production for all-out war – if necessary. Third, it would create the additional production capacity that would restore by that date our ability to resume the climb of the American civilian standard of living.

In technical and industrial terms the Wilson Plan seems to be feasible. If it is successfully carried out, we should be able to begin getting rid of controls rapidly by 1953. But to carry out the program successfully, it must now have vigorous support from everyone. That does not mean mere agreement that it is a good plan. It means that we must conform to the controls that are necessary to make the plan work. In developing this support, the business community is in position to exercise crucially important leadership.

As has often happened in our national history, we are confronted by a paradox. We must accept emergency controls for the time being to insure survival of the freedom that they infringe. But, as we do this, we may find some comfort in the reflection that while controls from Washington are hateful, controls from Moscow would be infinitely worse.

McGraw-Hill Publishing Company, Inc.



Inspectors studying radiographs of completed welds in the 26-inch-diameter, 1¼-inch-thick steel pipe.

A pipe line goes submarine and Radiography proves each weld

NATURAL GAS from Texas makes its final plunge into New York City through a 4800-foot pipe line laid under the bed of the Hudson River. Each joint was welded. And with 450 lbs. p.s.i. inside and the pressure of silt and 90 feet of water outside, these welds had to be sound and set for a long life. To make sure, the contractor had radiographs made of every joint.

This is how Radiography helps do important jobs well. It puts a valuable O. K. on welds. It helps build reputations for consistently good work.

Wouldn't you like to know how it is helping to increase business and improve production for others? Your x-ray dealer will be glad to tell you. Get in touch with him.

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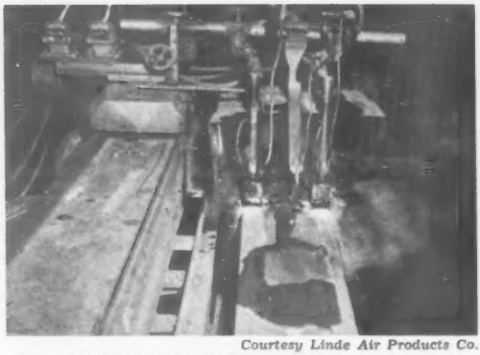
on the job

Courtesy A. N. Byers Co.

WROUGHT-IRON shells for bridge piles were made by bending ½-in. plate and welding the two half cylinders



Courtesy Linde Air Products Co.

TWO TRAVELING heads flame-harden both edges of a bulldozer center blade simultaneously to ¼-in. depth

Bridge Gets New Footings

(See left top picture)

SHEATHINGS of the concrete piles of the Bellamy river bridge in New Hampshire were showing serious deterioration. Worried engineers of the Department of Public Works and Highways decided to replace them with wrought iron.

The new shells were cylinders, made by bending ½-in. wrought-iron plate into a semicircular form and welding the two longitudinal seams. The old shells had a rectangular cross-section and were made by bolting two pieces together. The circular cross-section lessened resistance to tidal flow and avoided the high internal stresses caused by square corners.

The axis of the two welded seams was placed transversely to the direction of flow, in the belief that the presentation of a smooth surface on both upstream and downstream faces of the piles would help to extend the life of the plate (particularly at or near the weld metal) by reducing cavitation. Some indication of the severe conditions to which these piers are subjected is given in the above picture, which was taken near low tide. The marine deposits that mark the tidal range appear as white lines on the tubular sheaths.

* * *

Welded Aluminum Sphere

ALLOY FABRICATORS, Perth Amboy, N. J., has had good success with the inert-arc metal-arc welding of aluminum pressure vessels. In particular, the process has proved suitable for the welding of the higher tensile alumnium alloys of the heat-treatable types, with which tungsten inert-arc welding has not been successful.

Courtesy Air Reduction Sales Co.

TEN SEGMENTS of 61S-T6 aluminum were welded into this sphere

An example of an inert-arc metal-arc welded product is the 13-in. diameter sphere shown in the accompanying picture. This sphere was made by joining ten segments that were cold formed from ⅜-in. 61S-T6 aluminum, one of the heat-treatable alloys. Welding was accomplished at the rate of 23 ipm, using 1/16-in. 43S aluminum wire, a current of 205 amp and a mixture of helium and argon (30 cfh helium with 10 cfh argon) as the shielding gas.

Weld strength was assured by accurate fit-up between the machine-beveled segments as well as by careful weld procedures and heat treatment. All of the welds were heat treated except the closing seam, which, naturally, could not be readily quenched on the inside. The closing seam was welded in two passes from the outside against a reinforcing back-up ring. This was a single-vee joint. The other joints were double-vee beveled, and one pass was made on each side. The welded sphere had to pass a final hydrostatic test of 2,220 psig.

* * *

Flame-Hardening Dozer Blades

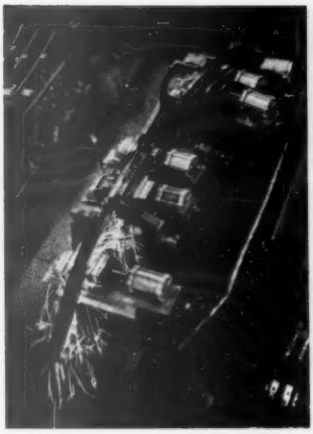
(See right top picture)

HIGH-SPEED automatic flame-hardening is today producing bulldozer blades that wear six times as long as the ordinary rolled-steel blades.

Isaacson Iron Works, Seattle, Wash., hardens both edges of center blades simultaneously by mounting two flame-hardening heads on a traveling carriage. The job is done while the blades are still hot from a bevel-cutting operation. The depth of hardness is ¼ in.; hardening speed is 10 to 12 ipm; degree of hardness obtained ranges from 550 to 600 Brinell.

Side-cutter blades are handled a little differently: both sides of one edge of the blades are hardened at the same time. Again, two flame-hardening heads are used, but the type of carriage is different. The depth of hardness is 3/16 in., and the hardening speed is 9 ipm. The amount of hardness is the same as the center blades.

Blade sections up to 21 ft long, 10 in. wide and 1 in. thick are hardened with this automatic set-up. These sections are then cut to the desired lengths. So great is the demand for the hardened dozer blades that Isaacson often works two shifts a day to fill orders.



Courtesy Square D Co.

FLASH WELDING Chevrolet frame at Van Nuys plant. Timer panels control the automatic sequencing

Sequence Welding Control

AT THE General Motors Chevrolet plant in Van Nuys, Calif., a specially adapted sequence of an electronic welder control operates the frame welding on the assembly line. One press of the "start" button by the operator automatically sets into operation five independent welds, each timed for four stages: squeeze, weld, hold and off. The result is speedier quality production with manpower savings reflected in lowered costs.

Heart of the electronic welding control is the weld timer panel. Ten timer panels are used in conjunction with frame welding in the Chevrolet plant. Since they control the first process on the asembly line, they are checked periodically to insure even, continuous operation.

Accompanying picture, taken looking down on the floor, shows the automatic sequence in a flash-welding operation controlled by the electronic weld control and sequence timer panels. Five points of contact are each controlled in four stages: squeeze, weld, hold, off. The entire sequence is initiated by one operator, who plugs in to set the stages as desired for each weld point.

* * *

War Contract for Trailers

WELDED trailers of military design for use in shipyards and army depots will be built by the Trailmobile Co. An unspecified quantity of trailers will be made in the company's west coast plant at Berkeley, Calif.

Save Costly Down-Time On Repairs With Bridgeport's No. 192 Low Fuming Bronze Rod

This gear housing for a 6-ton crane was repaired by braze-welding with Bridgeport's No. 192 Low Fuming Bronze Rod, thus saving the delay and expense involved in obtaining a new casting.

Repair hard-to-get equipment and reduce production losses by braze-welding. Less need for high preheats and elaborate repair set-ups means less lost time and lower costs. Repairs can often be made on the spot. Bridgeport's No. 192 Low Fuming Bronze Rod has excellent "tinning" and "filling" characteristics.

Want more information on how braze-welding can get your broken, cracked or damaged equipment back on the job with a minimum of down-time? A 24-page booklet, "Bronze Welding Alloys," is packed with valuable information. Write for your copy on company letterhead.

"Bridgeport" BRASS CO.

BRIDGEPORT BRASS COMPANY
Bridgeport 2, Conn. Established 1865
Mills at Bridgeport, Conn., and Indianapolis, Ind.
In Canada: Noranda Copper and Brass Limited, Montreal

Bronze Welding Rod A PRODUCT OF BRIDGEPORT BRASS

DAGMAR, "Miss Welder of 1951", receives certificate from F. F. Roehll, Eutectic's national sales manager

CUSTOM-DESIGNED to store and service welding equipment is this new structure for Big Three Welding Company

NEWS

Eutectic Dedicates New Administration Building

BRAINS and beauty attended the recent opening of the new administration building of Eutectic Welding Alloys Corporation, Flushing, N. Y. The first category was represented by Dr. Robert Humphrey, past chairman of the American Society for Metals, and professor Otto H. Henry of Brooklyn Polytechnic as well as by numerous borough and business officials.

Dagmar, famous NBC television beauty, was officially named "Miss Weldor of 1951" by the National Eutectic Welder's Club at the ceremonies. She was also selected as "the girl we would most like to weld with" by the graduate body of weldors who attend the company's welding institute.

The new building covers an acre in the Auburndale section of the city and will house all branches of the company, heretofore located in and about the New York metropolitan area.

A special guest from Europe was J. P. Hughes Wasserman, father of Eutectic's founder and president, Rene D. Wasserman. The elder Mr. Wasserman discovered the technique of low-heat welding in 1906.

• • •

Welding Brings Gas to 125 Major Cities

CURRENT construction of 7,618 miles of new natural-gas pipe line will bring new or additional gas this year to 125 cities of 50,000 or more population. Welding is involved in every step of the job, estimated to cost more than $630,000,000.

The fourth annual pipe-line survey made by the Gas Appliance Manufacturer's Association shows that major applications involving an additional 15,866 miles of pipe-line await hearing and disposition by the Federal Power Commission. The latest expansion brings pipe-line mileage to more than 296,000, including field and gathering lines, or 69,000 more than the combined mileage of all United States railroads.

• • •

Big Three Welding Occupies New All-Welded Structure

PLANNED specially for the storage and repair of welding equipment, two big new all-welded buildings were recently occupied by The Big Three Welding Equipment Company, Houston, Tex. Totaling 95,000 sq ft, the buildings were engineered and constructed by The Austin Co. They are a sharp contrast to the 20 by 40 ft welded pipe and sheet metal building erected by Big Three in 1922.

Pioneers in the welding of oil field equipment, Big Three did $30,000 worth of business in 1920, its first year, and $12,000,000 in 1950.

Unique provisions for storing and handling welding equipment are included in Big Three's new facilities, according to Lincoln Electric Company, one of the suppliers. One of the two new buildings houses a production line set-up for overhauling of welders. Equipment for major repairs moves on a system of conveyors. It is estimated that gasoline-engine driven welders can be completely rebuilt on this line at a rate of one per hour, with provisions for double that rate.

Gaseous and liquid oxygen are manufactured in the larger building, which has facilities for pumping the former through pipelines to nearby factories. Piping the oxygen (at pressures less than 200 psi) saves bottling and transportation costs to the consumer and also assures him an uninterrupted supply.

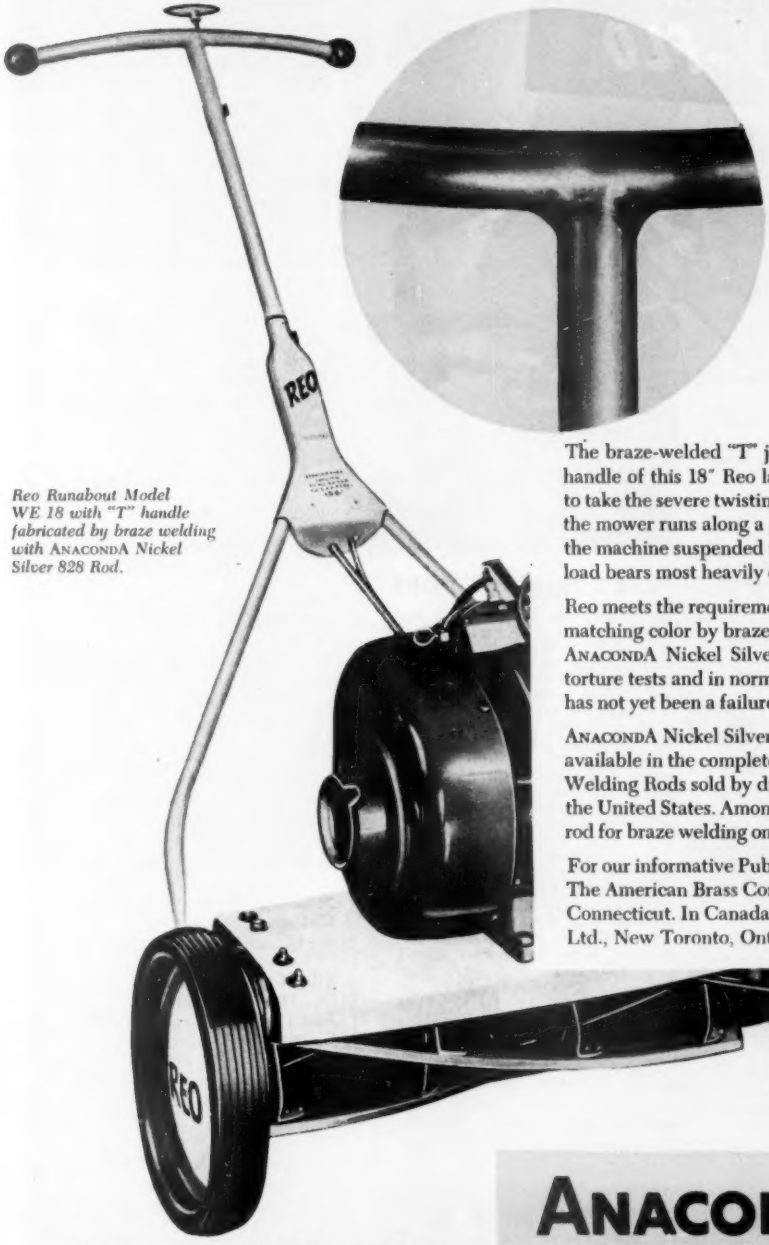
Liquid oxygen will be shipped to other Big Three outlets all over Texas in specially equipped trucks. The low-temperature liquid can be transported for long distances cheaper than high-pressure oxygen in cylinders.

Storage space for several hundred welders and four million pounds of electrodes is provided in the larger building. For maximum handling efficiency, "straight-line methods" coupled with the newest fork-lift trucks will be utilized. Within the building is a closed storage room for storing electrodes under optimum humidity conditions.

The Big Three Welding Equipment Company has offices and warehouses in Fort Worth, Houston, San Antonio, Dallas, Beaumont, Corpus Christi, Brownsville, El Paso, Odessa, Lubbock, Borger and Longview. Offices and warehouses through the Oklahoma Oxygen Company in Oklahoma are at Tulsa and Oklahoma City.

For strong and smooth welds

Reo uses ANACONDA Nickel Silver 828



Reo Runabout Model WE 18 with "T" handle fabricated by braze welding with ANACONDA Nickel Silver 828 Rod.

Close-up of "T" handle weld showing smooth, neat appearance of this ANACONDA Nickel Silver 828 braze weld.

The braze-welded "T" joint in the tubular steel handle of this 18" Reo lawn mower has to be strong to take the severe twisting it's put to every time the mower runs along a garden edge—with half the machine suspended in mid-air. And that twisting load bears most heavily on the weld itself.

Reo meets the requirements of both strength and matching color by braze welding this joint with ANACONDA Nickel Silver 828 Rod. Under torture tests and in normal service, there has not yet been a failure.

ANACONDA Nickel Silver 828 is but one of the alloys available in the complete line of ANACONDA Welding Rods sold by distributors throughout the United States. Among them you'll find the ideal rod for braze welding on your production line.

For our informative Publication B-13, write to The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

61150

braze or weld with confidence

ANACONDA®
WELDING RODS

FOR FAST, EASY, LOW-COST BRAZING ...you can't beat EASY-FLO

■ With EASY-FLO you can get any metal joining production you need—and get it with the greatest of ease. For this unusually free-flowing, fast-penetrating, low-temperature silver brazing alloy makes fast production brazing as easy as ABC. A good example is illustrated—an illuminating gas meter part, which has to be 100% gas tight. With the simple set-up shown at right, working two 8-hour shifts with one girl per shift, they braze 2600 a week — and they tell us this output could be easily increased.

HERE'S HOW IT'S DONE

Two stampings and a screw machine part are joined with a half-ring of EASY-FLO (arrow). Operator takes parts from cleaning bath—assembles them on positioning fixture with alloy half-ring preplaced at joint—applies flux—places assembly on brazing fixture and moves it into position under gas-air burners. Heating is automatically timed. By preparing assemblies while others are heating, operator turns out a steady stream of brazed parts.

In the finished part at left note the neat clean joint and the complete alloy penetration all through the joint area—one of the main reasons why EASY-FLO brazed joints are always leak-tight and stronger than the metals joined.

Photos and data courtesy of WIN MFG. CO. East Haven Connecticut

GET THIS INFORMATION-PACKED NEW BULLETIN 20

This bulletin gives you, not only the whole remarkable EASY-FLO and SIL-FOS brazing story, but also a lot of useful information about joint design and fast heating and brazing production methods. It's full of illustrations that contain ideas you can put to good use. Write for a copy today.

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Three Firms Join Work On New X-Ray Process

FASTER and cheaper inspection of weldments by X-rays may be the result of a new joint program just launched by Battelle Memorial Institute, Columbus, O., The Haloid Co., Rochester, N. Y. and General Electric X-Ray Corp., Milwaukee. Object of the program is the commercial development of xeroradiography, a fast, low-cost, dry, direct-positive process for producing X-ray images.

An electrostatic process, it will utilize re-usable plates and relatively inexpensive powders. Less than two minutes time with the new process would secure a "shadow" picture indicating the internal condition of a product.

Another advantage of xeroradiography is that neither the image or the plate is affected by any type of radiation including atomic radiation.

Xeroradiography is being developed at Battelle under Haloid-Battelle sponsorship. General Electric X-Ray is cooperating in the project and will market the perfected equipment through its nationwide district offices.

• • •

Welder Manufacturer Moves to Bigger Building

NEW address of the Precision Welder Manufacturing Company, Chicago 10, Ill., is 660 West Grand Ave. The new location provides three times the floor space available at former quarters at 5160 West Homer. Executive offices of the company are in the new building.

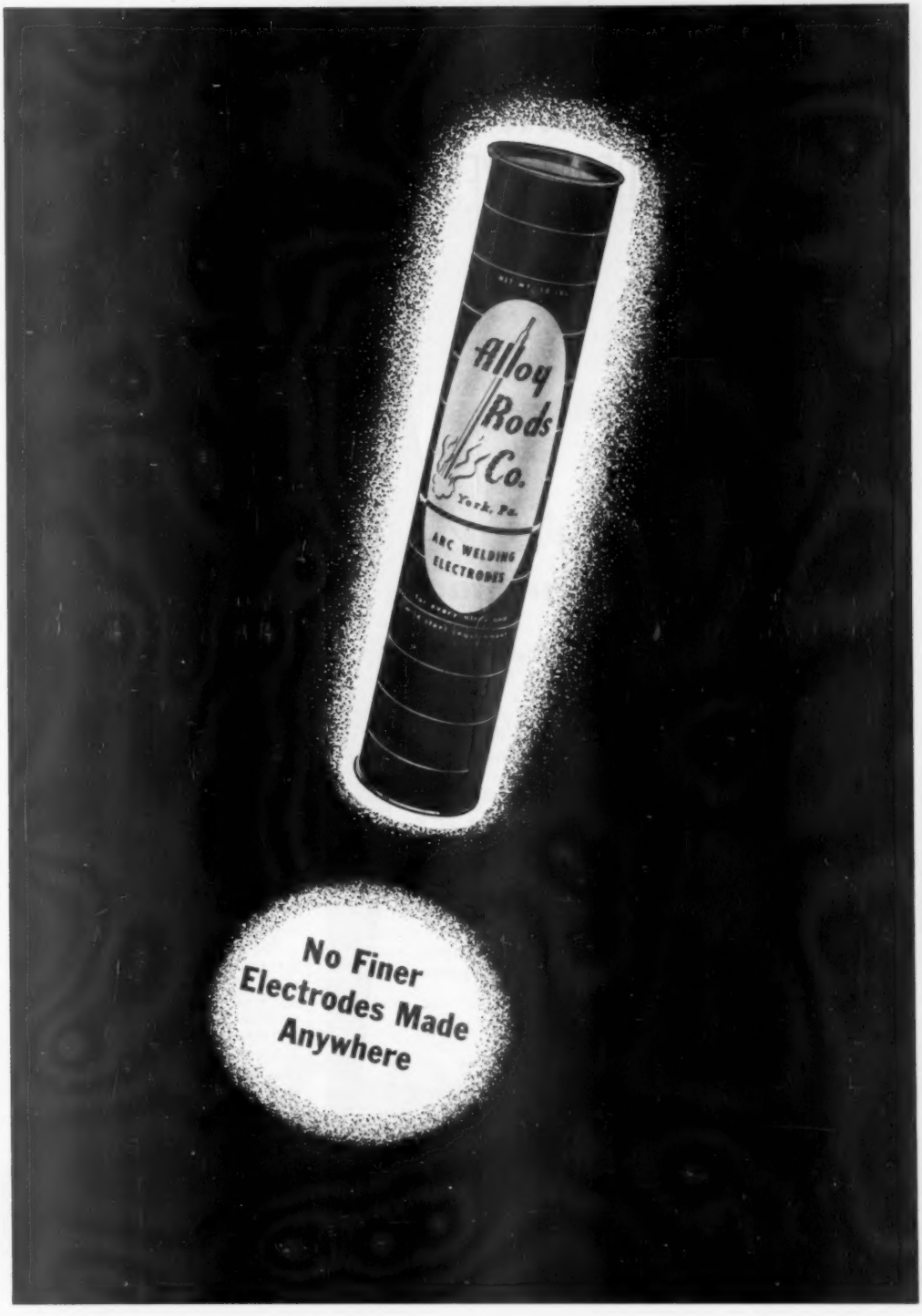
New machines and modern manufacturing methods installed in the 4-story building will boost output of the company's "Shop-King" welders to six times the old rate, according to H. C. Fields, general sales manager.

• • •

Chicago Arcos Office To Handle Eureka Rods

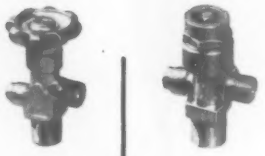
THE Welding Equipment and Supply Co., Detroit, announces that effective July 15, the Arcos Corp., 1500 South Western Ave., Chicago, will be the exclusive Illinois distributor of Eureka brand tool and die welding electrodes. Arcos will also handle the East Chicago, Gary and Hammond, Ind., areas as well as Milwaukee, Wis., Moline, Rock Island, Ill. and Davenport, Ia.

Head of the Arcos operation is Walter List, assisted by John Collins, Bill Craske and Pat O'Shea. Arcos has distributed Eureka rods on the east coast.


Alloy Rods Co.
York, Pa.
ARC WELDING ELECTRODES
No Finer Electrodes Made Anywhere

REGO

HIGH PRESSURE
CYLINDER VALVES



FOR OXYGEN AND HYDROGEN
Designed, tested and proved for high pressures and severe service. Packing may be replaced with cylinder under pressure if necessary. Fuse plug and bursting disc provide positive safeguard. Bronze stem furnished as standard, also available with monel stem on special order.

FOR ACETYLENE
Cadmium-plated steel stem with monel tip resists rust and wear. Ball-nose seat construction assures positive shut-off.

FOR CARBON DIOXIDE
Available with diaphragm-type or packed-type construction. Compact rugged design for use with high pressures. Equipped with bursting disc safety device.

REGO

The BASTIAN-BLESSING Company
4201 West Peterson Ave. Chicago 30, Illinois

PIONEER AND LEADER IN THE DESIGN AND MANUFACTURE OF PRECISION EQUIPMENT FOR USING AND CONTROLLING HIGH PRESSURE GASES

*Reg. U. S. Pat. Off.

TURRET ring for Patton tank hull is welded in Baldwin locomotive plant

Welded Patton Tank Hulls Get in High Production

SUPPLY of the redesigned and standardized M-47 General Patton army tanks to our fighting forces is rapidly increasing as the Baldwin-Lima-Hamilton Corporation brings production up at its Eddystone plant. Makers of welded tank hulls generally have to wait a long time for new machinery, custom-built jigs, etc., but Baldwin got in gear quickly by salvaging 300 tons of steel plates and shapes which were turned into welding jigs and fixtures.

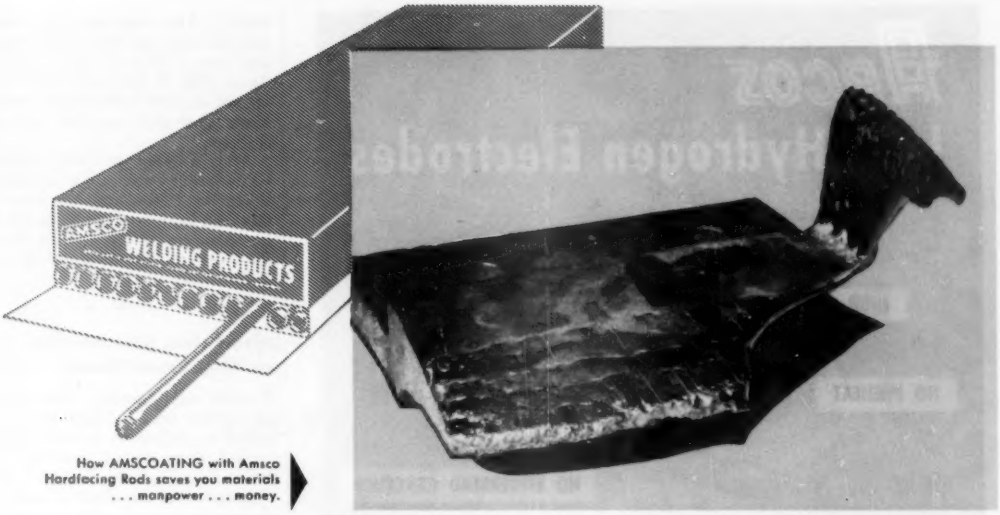
A great deal of tank work is accomplished with positioners so that the weldors won't have to be so highly trained. Completely new sets of jigs and fixtures are required because of design changes since the Baldwin plant ceased making tanks in 1945.

The tank hull shop was set up as a separate organization. The superintendent for the shop and foremen were brought in from other departments. A few supervisors who had retired consented to return to help out.

Space for the plant was provided in the former steam locomotive boiler shop, no longer used because of the universal changeover to diesel locomotives. By July 1, the shop will have 350,000 sq ft in five 80-ft wide by 875-ft long bays in tank hull production. It is expected that at any one time there will be 150 hulls in process.

Handling on the production line is minimized by one-way material flow, down one bay and back the next and by the flexibility of motor-operated welding positioners. Special arrangements are necessary for the 25 and 75-ton capacity overhead cranes that operate in each bay, because they are needed for almost 95% of hull component handling.

Welding is done with 500 amp a-c



How AMSCOATING with Amsco Hardfacing Rods saves you materials . . . manpower . . . money.

AMSCOATING . . . saves hundreds of dollars per month in pulverizing!

AMSCOATING . . . stands for control of wear by Hardfacing . . .

Hardfacing rods—and recommendations for their use—are as sound as the manufacturer who makes them. AMSCO has been fighting wear for a half-century—first with Manganese Steel, and later with AMSCO Hardfacing Products.

If you have a problem of wear caused by impact, abrasion, heat or corrosion . . .

Find out how AMSCOATING can save you materials . . . manpower . . . money!

A large Pennsylvania brick company was faced with this problem: pulverizer plows wearing out every two weeks due to extreme abrasion of clay with a high silica content. An expensive period of down-time and replacement labor resulted.

In trying to stop this high replacement cost, a test was made. Each plow was AMSCOATED with an Amsco® rod specially developed for high resistance to abrasive wear.

Result? The Amscoated plows lasted 4 times as long . . . 3 out of every four replacement jobs were eliminated! The saving amounted to several hundred dollars each month!

AMSCOATING permits big savings—through longer service and fewer replacements—on many other applications. If you have an equipment part that's subject to wear, the possible savings—*to you*—are too big to be overlooked!

Write today for illustrated catalog—and nearest distributor's name.

AMSCOATING

THE RIGHT WAY TO SAY HARDFACING

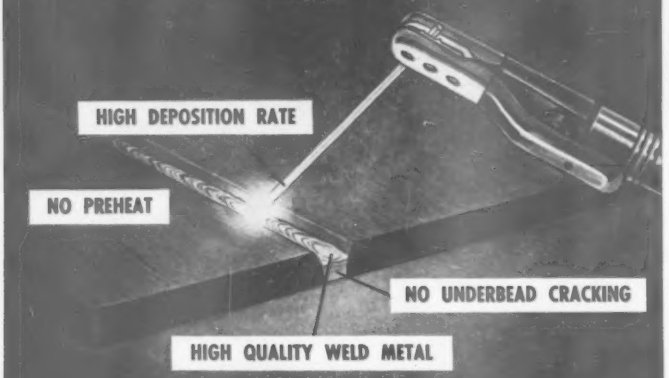
AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION

382 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que. Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

ARCOS
Low Hydrogen Electrodes



Speed Production—
Save Critical Materials

Producing quality welds on high tensile fabrication jobs is essential today. Rewelds cost time and money. That's why it will pay you to depend on ARCOS—leader in the low hydrogen electrode field.

You get trouble-free, uniform welding performance because low hydrogen electrodes get the same rigid quality controls developed for the very critical requirements of Stainless. Arcos low hydrogen electrodes stay "factory fresh" because they are packaged and protected against moisture pick-up in the same careful way Arcos has always packaged its stainless electrodes.

ARCOS CORPORATION
1500 South 50th Street • Philadelphia 43, Penna.

WELD WITH

ARCOS
Specialists in Stainless, Low Hydrogen and Non-Ferrous Electrodes

welders. The electrodes are a special purpose alloy for armor and range in size from 5/32 to 5/16 in. diameter. About 800 lb of weld metal is deposited in each hull, to join some 20 heavy steel plate members and eight castings.

After welding, the hull undergoes six separate machining operations. When the 15-ton hulls are machined they are loaded in pairs on flat cars for shipment to the Detroit arsenal. The company has $60,000,000 worth of tank orders.

• • •

Save Labor, Get Strength on Steel Frame House

WELDED steel framing shows several advantages over wooden frames for homes according to a recent project carried out by student Vincent E. Morgan at Pratt Institute, Brooklyn, N. Y.

Comparison for the cost estimates was based on two houses, each having overall dimensions of 26 by 36 ft with an 8-ft ceiling. The wooden house had a conventional roof with a 5/13 pitch. If the pitch were less the wooden roof members would have to be larger to carry a load of 100 lb per sq ft.

Foundation and roof coverings for both houses were the same so they were left out of cost estimates. The total cost of the wooden frame was $555.85 as compared to $552.50 for the welded steel frame, or for all practical considerations the same.

Advantages of the welded steel house showed up when labor costs were compared—the wooden frame involved 116.5% more work than the steel one. This is offset by the greater cost of the steel for the welded frame, 27.9% higher, than for wood. As one builds larger homes, the cost advantages of welded framing becomes more evident.

Even if costs were to stay parallel, however, there are other selling points for steel. It has a greater durability and resistance to fire, there is little likelihood of sagging after several years, less material is needed and the steel frame permits the use of large overhangs, windows and exterior openings.

• • •

New 6½-Acre Plant For Norton Company

To meet demands of the present defense effort, Norton Company is building a new 740 by 300 ft factory joining a 360 by 100 ft office building. The new facilities will provide 275,000 sq ft of working space and enlarge the company's grinding and lapping machine manufacturing capacity by 50%.

A NEW NAME FOR SAFETY
FROM ONE OF AMERICA'S
OLDEST LENS MAKERS!

PENOPTIC*
TRADE MARK

SAFETY LENSES

Announcing a complete line of quality replacement lenses, including flat, 1.25 curve, 6.00 curve and (antiglare) green absorptive lenses.

They offer a high quality of protection, assured by more than a quarter century's experience in precision lens making.

Order them *direct*. Save with safety!

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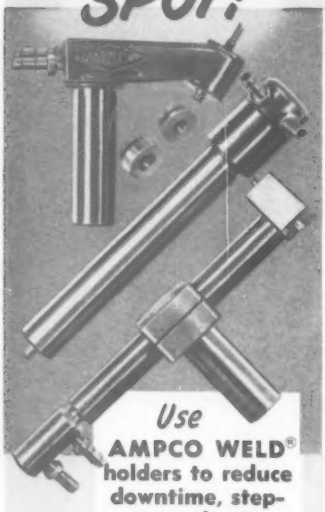
Known for Fine Ophthalmic Products Since 1886

**PENOPTIC is the trade name of Pennsylvania Optical Company*

Put resistance welding costs on the SPOT!



Use AMPCO WELD® holders to reduce downtime, step-up production

There's an AMPCO WELD® holder for every resistance-welding job — offset ejector holders, straight ejector holders, universal ejector holders. All are leak-proof. Made of high-conductivity Ampco Bronze alloys, they meet or exceed RWMA specifications to give you trouble-free operation, longer runs, reduced downtime, and increased output.

. . . AMPCO* Engineering Service when you need it

Behind the famous AMPCO WELD® line of resistance-welding products is a corps of experienced engineers, ready to help you solve your problems. Just get in touch with us.

AMPCO METAL, INC.

AMPCO® MILWAUKEE 46 WISCONSIN RW-3

West Coast Plant, Burbank, California

It's production-wise to Ampco-ize!

*Reg. U. S. Pat. Off., Ampco Metal, Inc., Milwaukee

Injected Oxygen Boosts Bessemer Converter Output

By adding oxygen to the normal air blast in Bessemer converters, extra amounts of hot metal for open hearth steelmaking can be produced. National Tube Company first experimented with the use of oxygen this way when a blast furnace went out of operation last year, causing a shortage of metal for the open-hearths.

Injecting 4,000 to 6,000 cu ft of oxygen per "blow" the normal steel scrap charge in a 30 ton operation can be increased by about two tons and blowing time can be decreased by about one minute.

Experience with oxygenated bessemer blows proved so successful that one converter has continued in such service although all blast furnaces are now in operation at National Tube Company.

The hotter temperatures caused by the use of oxygen do not damage the refractory brick lining and bottom of the converter, according to W. G. McDonough, superintendent, open hearth and bessemer department, of National Tube. There is some evidence that the more intense flame keeps objectionable crusts from forming on the brick.

* * *

Mine-to-Wheel Story Told in Norton Movie

"Grits that Grind," a new Norton Company color movie, shows the complete journey of abrasives from the bauxite mine in Arkansas to the finished product in Massachusetts. The 30-minute film touches on other Norton products such as grinding machines, refractories, pulpstones, sandpaper, sharpening stones, porous mediums, non-slip floors and tile and wear-resistant products.

The film is 16-mm size and may be obtained free on loan by writing to "Grits that Grind," Norton Co., Worcester 6, Mass.

* * *

National Cylinder Builds Oxygen Plant at Miami

Construction has begun on a new oxygen and nitrogen liquefaction plant for National Cylinder Gas Company at Miami, Fla. It will be finished in August. Capacity will be about five million cu ft per month. NCG has an acetylene plant in Miami but has supplied the Miami area with oxygen from its Jacksonville plant. The new Miami plant will be under the general supervision of G. L. Reynolds, the firm's Florida district manager.

THE
ARC-FIT
PROCESS
Tube notched with special ARC-FIT
Angular notch on tubular member.
Square tube notched to fit square pipe.
Angle joint on two pipes.
"T" notch on end of Tubular member.
Pipe Notched with deep slot.
"T" joint on tube or pipe.
Angle iron notched to fit pipe.

TOPS IN SHOP EFFICIENCY

5 seconds to notch Tubing and Pipe Ends

The answer to many problems confronting large and small shop owners. No shop can afford to be without the ARC-FIT—no matter how large or how small. Manual or power operated—fits the ARC-FIT hand press or any standard power press.

ARC-FIT is a patented precision-built shearing tool which prepares the ends of tubing or pipe to produce welded or brazed tubular "T" or angle joints. ARC-FIT will not deform the tube or pipe and no further finishing is required—no sawing, cutting, or removing sections with milling cutters. Our literature gives many fine points on operation, construction, and application—send for it today—also write for quotations.

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RUFLUX T
for Low Hydrogen Electrodes
Ruflux T is desirable in welding electrode coatings principally because of the speed with which a slag containing zirconium oxide sets up and the better slag control provided.
Ruflux T is a compound containing approximately 91.5% ZrO and 5.4% SiO_2. Mesh size is approximately 0.1% on 325 mesh.
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the Torch for the tight corners

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HC-32
Feather-Weight
CUTTING TORCH

Superbly-balanced, the HC-32 is ideal for many cutting jobs. It is lightweight, easy-to-handle—especially convenient where working space is limited . . . you can use it on heavier jobs too, without overheating.

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We manufacture a full line including Oxygen, Acetylene, Hydrogen and Nitrogen.

DISTRIBUTORS: *Liquid offers a complete line of industry-proved, nationally-used and advertised, top-profit, welding and cutting equipment.*

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Gentlemen: Please send me full information on Gasweld Welding and Cutting Torches and your new catalog of equipment and supplies.

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Firm_____
Street Address_____
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G-E X-Ray Becomes Department of G-E

GENERAL Electric X-Ray Corporation, Milwaukee, became a department of the General Electric Company on June 30. John H. Smith, formerly president of the manufacturing affiliate, is general manager of the new department.

The X-Ray department is now part of the Apparatus Group, one of the three main operating groups of General Electric. The change will cause little alteration in the activities or scope of G-E X-Ray, according to Mr. Smith.

A new 15,000,000-volt betatron for the examination of thick metallic sections will be included in the department's future products.

* * *

More Producing Space For All-State Welding

MORE than double present manufacturing area will be available this fall upon completion of a new building for All-State Welding Alloys Co., Inc., White Plains, N. Y. The new structure adjoins the present All-State plant at 273 Ferris Ave. It will house modern equipment for extruding, flux coating, cleaning, straightening, cutting, drying and packaging. It will also provide extra engineering and laboratory space.

* * *

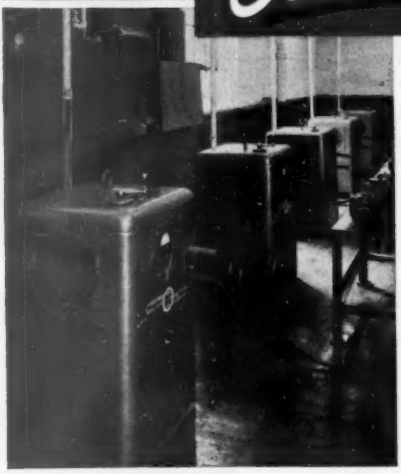
(Photo courtesy Nelson Stud Welding Div.)

HIGHEST stud welding holds cables to Empire State tower for television

Stud Welding Holds Conduit to High Tower

THE conduit straps for holding radio and television transmission lines to the new 220-ft tower on top of the Empire State building are stud-welded for strength. Contractors for the job, the highest stud welding ever done, are B. Eichwald and Co.

WESTINGHOUSE RECTIFIER WELDER *Solves* CRITICAL THIN-GAUGE PROBLEMS



The exceptionally thin metals welded by Badger demand an absolutely steady arc at low current settings. Five Westinghouse Rectifier Welders with extended current ranges allow a 10-ampere minimum setting.

for The Badger Fire Extinguisher Company

Expansion Joint Division

"The Westinghouse D-C Rectifier Welder is the only welder which can handle our critical welding jobs at every point," says Mr. Walter Benson, Engineer of the Badger Fire Extinguisher Company, Expansion Joint Division, Somerville, Mass.

Welding specifications are especially rigid at this plant. The stable arc that the Westinghouse Welders supply at low current settings is essential in welding the thin metals used. These welders make uniformly tight welds on critical diaphragms and expansion joints which range in gauge from .10 to .125 inches. They handle tricky edge welds on parts ranging in size from that of a dime to that of a dinner plate.

Because most stresses occur at the weld, a joint that is as strong as the metal itself is required. The Westinghouse Rectifier Welder produces this strength in all welds. On the edge welds, penetration at least 1½ times the thickness of the metal is achieved.

Operators like the quiet performance of the Rectifier Welder. Management likes the fact that the machines do not accumulate or scatter dirt—good thin-metal welding demands scrupulously clean working surfaces.

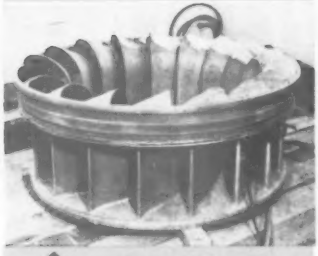
You may never have to weld wafer-thin metals but, whatever your application—large or small—the Westinghouse D-C Rectifier Welder will handle the job best. Call your nearest Westinghouse Distributor or write Westinghouse Electric Corporation, Dept. DC-56, Welding Division, 4457 Genesee Street, Buffalo, New York. J-21610

YOU CAN BE SURE... IF IT'S

Westinghouse

Rectifier Welders

"Bronze-Facing" with Ampco* Electrodes
Saves
$4800



4-ton turbine runner "Bronze-Faced" with Ampco Electrodes.

Cavitation and erosion caused severe wear on the buckets and blades of this large 4-ton turbine runner. A new runner costs $6000. "Bronze-Facing" with Ampco Electrodes cost only $1200 — a savings of $4800!

Better Than New!

"Bronze-Facing" with Ampco Electrodes is used throughout industry to increase service life, provide superior bearing qualities, obtain improved resistance to wear and keep costs down . . . production up.

You too can save time and money by using Ampco Electrodes in your repair and maintenance operations. Get a supply today from your Ampco distributor, or write us.

Power company personnel preparing turbine runner for "Bronze-Facing" with Ampco Electrodes.

W-114

AMPCO
Ampco Metal, Inc.
Milwaukee 46, Wis.
West Coast Plant, Burbank, California
It's Production-Wise to Ampco-ize!
*Reg. U. S. Pat. Off.

Flame-Cut 13 Locomotives To Boost Wire Production

END of the line for 13 retired railroad locomotives recently was the scrap yard of the American Steel and Wire company plant at Worcester, Mass. They will provide a 2,000-ton shot in the arm in this U. S. Steel subsidiary's program of rounding up badly needed scrap.

Making their final 100-mile run behind a modern Diesel locomotive, the old retired engines were pulled to a special side track for the dismantling operations. The cutting crews will require more than 18 weeks to reduce them to heavy melting scrap size (about six by one and one-half ft).

After flame-cutting all scrap has to be carefully sorted. Plates, tubes, wheels, fire boxes and other steel sections go to the open hearths. Cast iron and similar material goes to foundries. Copper, brass and bronze parts are returned to the railroad for remelting into replacement fittings for Diesel locomotives. It is estimated that more than 4,000 cylinders of oxygen will be consumed in this operation.

* * *

Battelle Institute Starts New $1,000,000 Building

CONSTRUCTION has begun on the million-dollar laboratory planned by Battelle Memorial Institute, Columbus, Ohio. The three-story structure will have two bays for pilot plant operations and will house 115 unit laboratories, including at least one for welding experiments.

Currently, Battelle's research volume surpasses $8,000,000 annually and include important defense studies for the Atomic Energy Commission, the army, navy and air force.

* * *

Allis Chalmers to Make Turbo Jet Compressors

A multimillion dollar order for jet engine compressors has been let by Curtis-Wright Corporation to Allis-Chalmers Manufacturing Co. The compressors will go into J65 Sapphire turbo jet engines, originally developed in England, but to be manufactured under license here by Curtis-Wright. Dry thrust rating of the engine is reported to be more than 7,200 lb, one of the highest ratings thus reported.

The contract requires the building of a new plant costing more than $5,000,000 on 200 acres near Terre Haute, Ind. When the plant is in full production, it will employ 3,500 or more persons.

TIME is MONEY
and THERMACOTE PRODUCTS SAVE BOTH

THERMO Spiral
TIP CLEANERS
are guaranteed unbreakable. They do a cleaner, smoother job because the new spiral design prevents carbon and slag from jamming in the orifice and eliminates breaking of the cleaner when cleaning tip.

TRIPLE DUTY
COVER LENS
are guaranteed to outlast any lens at any price. They provide clearer vision, eliminate eye strain.

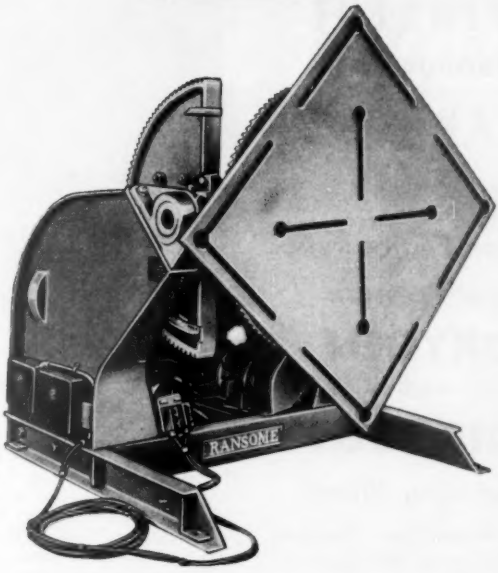
KORNER KLAMP

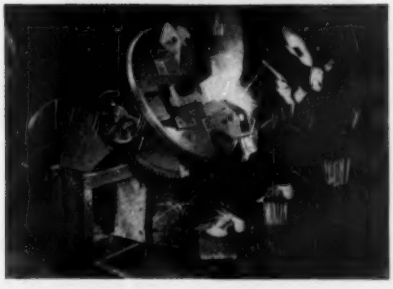
PAY FOR THEMSELVES EVERY TIME USED
because a perfect 90° angle is assured every time when welding 2 pieces and spoilage is eliminated.

THERMACOTE CO.
NEWARK CHICAGO LOS ANGELES

Lots of Different Pieces or Lots Alike...

THIS POSITIONER PAYS OFF





in more production . . . better welds . . . less rod waste

The universal table top makes the Worthington-Ransome Welding Positioner as profitable on *job* work as it is in mass production.

Those "T" slots make the table adaptable to any shape of work piece and a wide range of sizes. No special jigs or fixtures needed.

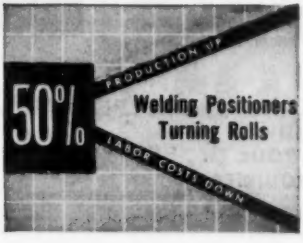
Result—up to 50% more footage, *better* welds (using higher current and heavier rods), less welding rod waste.

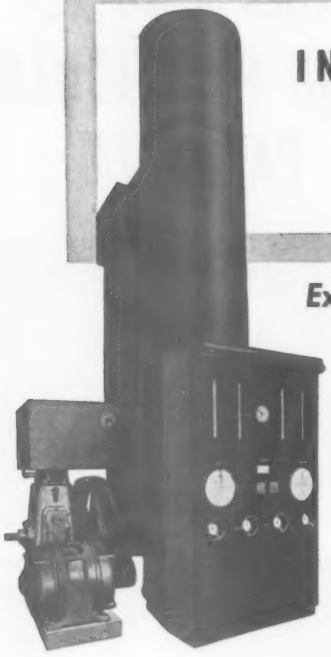
Welding positioner capacities from 100 lb to 30 tons. Also: turning rolls from 3 to 150 tons, stationary or self-propelled.

Write Worthington Pump and Machinery Corporation, Dunellen, New Jersey, for bulletins or additional information.

Y.1.2

WORTHINGTON





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GAS PRODUCING
PLANTS

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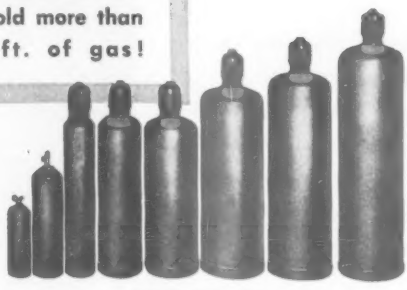
Low Pressure
OXYGEN
AND
NITROGEN
Producing Plants

Built in standard sizes—15 meters or 530 cu. ft to 283 meters or 10,000 cu. ft.—in single and double rectification units. If you need them, larger sizes are available.

If the more than one quarter of a million INDEPENDENT CYLINDERS we have built were filled at one time, they would hold more than 50,000,000 cu. ft. of gas!

Furthermore, Independent Acetylene Cylinders hold from 5 to 10% more gas, and the uniformity of the monolithic filler insures even distribution of acetone. Storage cylinders available in 12' and 20' lengths; capacities 850 and 1500 cu. ft.



10 C.F. 40 C.F. 60 C.F. 100 C.F. 150 C.F. 250 C.F. 300 C.F. 340 C.F.

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O'FALLON 5, ILLINOIS

LEATHER workers in painting show cooperative and competitive spirit

Special Painting Symbolizes Company's Profit-Sharing

THE unique profit-sharing plan in effect at the Glover Leather Division of the Colonial Tanning Co., Inc., Milwaukee, is symbolized in a special painting commissioned by the company. Titled "So Shall He Reap," the picture was done by Aaron Bohrod, well-known American artist.

It shows tannery workers trimming splits in the splitting room of Colonial's Milwaukee plant. Gustave Sokol, general manager of the Glove Leather Division explains the painting thus: "It is a symbol of the American way—the way of harmony and cooperation through discussion and negotiation, the way of men and women of all colors, races and creeds working together. No one is driving these workers. They are motivated by the knowledge they are partners who share in the profits; members of a team eager to make a bigger and better pie so they can get a larger slice for themselves, as well as benefiting the community by increased abundance."

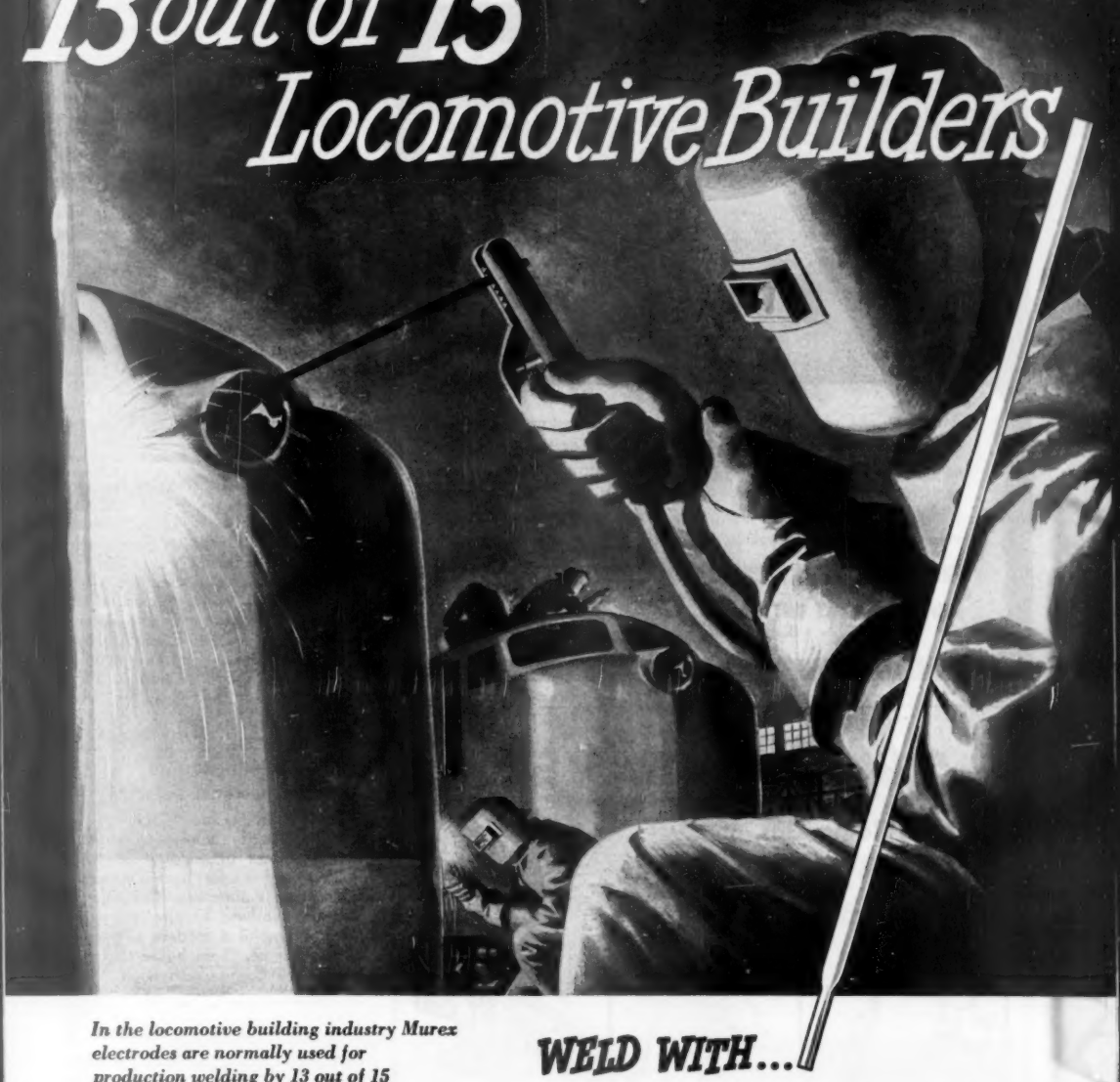
Colonial has been a pioneer in the field of profit-sharing arrangements. For 26 years it has provided automatic wage increases, pensions for all, paid vacations and worker participation in management.

* * *

G-E Appoints Distributor For Stainless Electrodes

THE Machinery and Welder Corporation, St. Louis, Mo., has been named a distributor for General Electric stainless steel welding electrodes. This is an addition to the line of G-E a-c welding equipment and mild steel electrodes that Machinery and Welder has carried for more than 20 years.

13 out of 15 Locomotive Builders



In the locomotive building industry Murex electrodes are normally used for production welding by 13 out of 15 foremost producers.*

Murex electrodes are preferred in locomotive building, first, because they make possible high speed welding essential to maximum production — second, because they can be depended on for consistent, day-in-day-out results in meeting exacting specifications for weld soundness and physical properties.

*Those with AAAA financial ratings.

WELD WITH...

MUREX®

METAL & THERMIT CORPORATION

100 EAST 42nd ST., NEW YORK 17, N. Y.

Electrodes • Arc Welders • Accessories

Protect your eyes with MODERN ALL-PLASTIC

MODEL 10G3 ONE-PIECE WELDER'S GOGGLE

Eye-Savers give you comfortable fit, good-looking construction and *sure* eye protection—all at the same time! One-piece flash goggle 10G3 provides complete safety for under-helmet use and other glare and impact hazards. Shatterproof plastic lens is green tinted, optically clear, and may be replaced. Fits over most style glasses and permits comfortable, wide angle vision. Order from your welding (or safety) supplier or write direct.

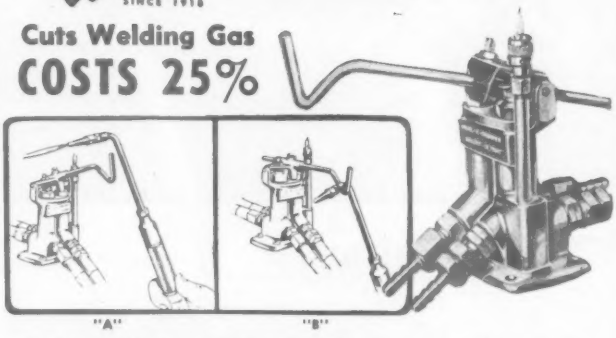
FREE! *Send for magazine article giving impartial advice on best uses of plastic eye protection. Eye-Savers catalog also included.*

WATCHEMOKET OPTICAL CO., INC. DEPT. 5, PROVIDENCE, R. I.

Producers & Originators of Practical Plastic Eye Protection

Weldit INC SINCE 1918 GASAVER

Cuts Welding Gas COSTS 25%



"A" "B"

The famous Weldit Gasaver Model E, the original gas saving unit reduces gas consumption 25%. Case histories throughout industry prove this economy.

The Weldit Gasaver automatically shuts off the torch flame between welds. See illustration shown above . . . "A"—shows the ignited torch about to be hung on the lever rod of the Gasaver; "B"—when the torch is hung in place the flame is automatically extinguished. To relight, lift torch off lever rod, pass over pilot light which instantly ignites it to a predetermined flame.

The Weldit Gasaver increases production and cuts fire hazards.

WELDIT TORCHES . . . FOR THE MAN WHO CARRIES THE TORCH

992 OAKMAN BLVD.

Weldit INC SINCE 1918

WRITE FOR BULLETIN NO. 10A.

DETROIT 6, MICH.

CANADIAN DISTRIBUTORS • ALLOY METAL SALES • 881 BAY ST. • TORONTO 5, ONT.

Complete Acetylene Plants Furnished by Sight Feed

THE Sight Feed Generator Company, West Alexandria, O., now manufactures a wide range of capacities of complete acetylene compressing plants. Basic source of acetylene for the plants is the company's recently announced "Model A-Twin Generator."

No gas holder is needed in the new Sight Feed installations, says the company, since the generator supplies enough pressure to force the acetylene through piping and purifier to the compressor.

The company will assemble acetylene plants in a wide range of sizes to produce from 240 to 3,000 cu ft per hour.

* * *

Eutectic Continues Special Welding Classes

EUTECTIC Welding Institute has continued its special series of one-week welding classes for advanced weldors into the summer months. Classes were scheduled for June 11, June 25, July 16 and August 20. Members of the armed forces and government employees connected with the defense effort are enrolled without charge. For information, you may write to Dept. P, Eutectic Welding Alloys Corp., 172nd St. and Northern Blvd., Flushing, N. Y.

* * *

Empire Products Buys Welding Accessories Firm

EMPIRE Products Inc., Cincinnati, O., has purchased Cam-Lok Company, manufacturers of welding electrode holders and solder and mechanical type cable connectors. Coincidental with the purchase, Empire announced the building of a modern new plant at Rossmoyne, O. to house the company's new Cam-Lok Division.

* * *

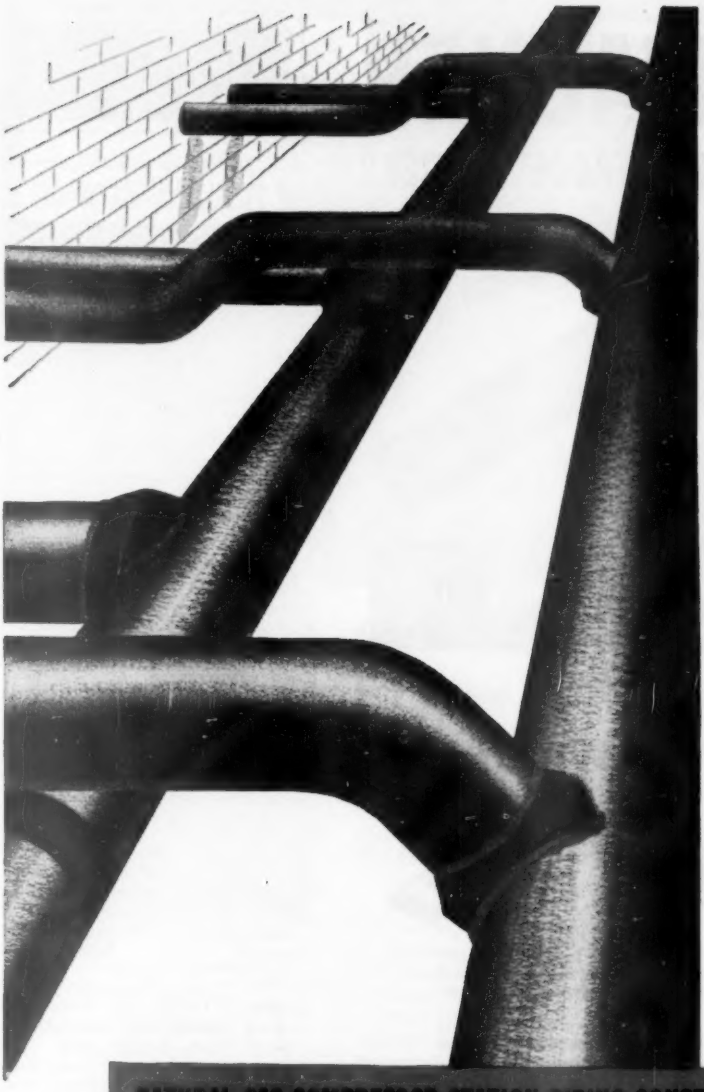
New G-E Welding Distributors

FIVE new General Electric welding distributors have been announced by G-E's welding division at Fitchburg, Mass: Welding Engineering & Equipment Co., Syracuse, N. Y.; Welding Sales Corp., Newark, N. J.; Welding Equipment Sales Company, Buffalo, N. Y.; The Alabama Oxygen Company, Birmingham, Ala.; Odland Iron Works, Toledo, O.

* * *

Change Rod Maker's Name

PERMALATEM Welding Alloys Corp., is the new name of Frigilatem Welding Alloys Corp., Neptune, N. J. A. E. Zeisel is president of the firm.



WELDOLETS

WELDING FITTINGS FOR ANY PIPING SERVICE

NATURAL GAS COMPRESSOR STATION PIPING CONSTRUCTED ECONOMICALLY AND EFFICIENTLY USING WELDOLET WELDING FITTINGS THROUGHOUT

This installation, together with a number of important applications of WeldOlet Welding Fittings in various types of service is shown in the new Bonney W-3 WeldOlet Catalog.

The completely new Bonney catalog will furnish descriptions, dimensional information and installation instructions. The technical section demonstrates graphically how WeldOlet Welding Fittings offer the quickest, safest and most economical method of establishing and maintaining 100% pipe strength at branch connections in accordance with code provisions.

Write for your free copy to: BONNEY FORGE & TOOL WORKS 366 Gross St., Allentown, Pa.
Export Distributors: NATIONAL SUPPLY EXPORT CORP., 600 Fifth Ave., N. Y. 20, N. Y.

WAGNER

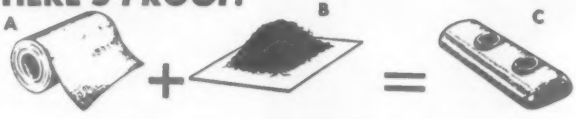
ELECTRODE HOLDERS

WITH *IMPROVED* "COPPERHEAD" INSULATOR TIPS

INSURE ADDED

ECONOMY in Welding

HERE'S *PROOF:*



1st a heavy Woven Glass Fabric, (Fig. A) provides cover protection to insure the impact strength necessary to withstand the shock of dropping and tough operating conditions.

2nd Long Asbestos Fibres, (Fig. B) insure greater protection against radiated heat of the arc, as well as providing impact strength, and adequate electrical insulation.

3rd Plastic Resin of extreme heat-resisting qualities bond "A" and "B" together to provide protection against high temperatures and pressures, with the result that these improved "COPPERHEAD" Insulating TIPS make the WAGNER ELECTRODE HOLDER the most practical and economical to use.

WAGNER WELDING PRODUCTS *are the result of more than thirty-three years of experience in welding and practical knowledge of mechanical and electrical engineering. WAGNER products are sold only through Welding Supply Dealers, or write us direct for further details.*

WAGNER MANUFACTURING CO.
250 W. 1st SOUTH ST. JACKSON, MISSOURI

About People

A. F. DAVIS, vice president, director and secretary of The Lincoln Electric Co., Cleveland, recently received an honorary Doctor of Science degree from Mt. Union College, Alliance, O. (P.S. His friends still call him "Charlie.")

* * *

J. S. ROSCOE has been appointed director of purchasing for The Lincoln Electric Co., Cleveland. He has been with Lincoln since 1924 and has made notable contributions to the practical applications of automatic carbon arc welding, shipyard welding on the Great Lakes and automatic hard-facing. He was formerly district manager in Syracuse, Pittsburgh and Chicago.

* * *

LARRY P. ENGLISH has been named chief engineer of KSM Products, Inc., manufacturers of standard and special welding studs. His headquarters will be in Merchantville, N. J.

* * *

EDWARD J. SCHAFFER has been named Midwest sales manager for The Thermacote Company, Newark, N. J. Having been with Thermacote for 10 years, he was formerly in charge of sales in the Pacific Northwest.

* * *

OVE GREEN has been appointed assistant to the technical secretary, S. A. Greenberg, of the American Welding Society. He was formerly with the research staff of National Cylinder Gas Co.

* * *

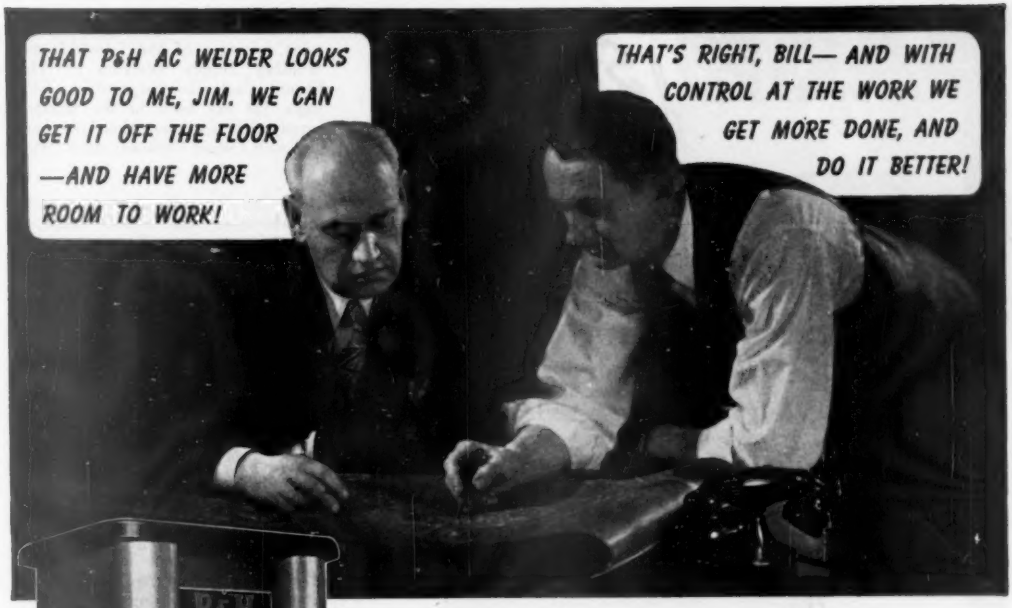
HARRY A. DENNIS was recently appointed assistant sales manager for Graver Tank & Mfg. Co., Inc., Chicago. He was formerly sales manager of the company's weldment division and the alloy division. Before working for Graver, he worked for Lukens Steel Company in welding research and service engineering.

* * *

DR. W. H. BRANDT has been named manager of the special products development division of Westinghouse Electric Corporation. DR. S. W. HERWALD will be engineering manager of the division.

* * *

J. R. BUSH has been named welding consultant for the Georgia State Highway Bridge Division at Atlanta.


THAT P&H AC WELDER LOOKS GOOD TO ME, JIM. WE CAN GET IT OFF THE FLOOR —AND HAVE MORE ROOM TO WORK!
THAT'S RIGHT, BILL— AND WITH CONTROL AT THE WORK WE GET MORE DONE, AND DO IT BETTER!

Save floor space, cut welding time for more production at lower cost

. . . . use P&H AC Arc Welders with exclusive Dial-lectric remote control

Give yourself more room for your production needs. Mount your P&H Welder off the floor, out of the way.

Dial-lectric remote control lets you do this. Your operator can turn the heat on *at the work*. It also cuts down his "walking time" . . . turns it into *welding* time for increased output.

Besides saving space P&H Dial-lectric control eliminates cores, coils, sprockets, gears and other moving parts that cause excessive maintenance and downtime.

P&H AC Welders are available in a full range of sizes up to 625 amps. See your P&H representative or distributor for full details on how this outstanding welder can save you time and money.

Specialized Training

Metal Welding Fabrication

1 week to 18 months

Harnischfeger Welding Training School

in conjunction with

Milwaukee School of Engineering

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Excavators • Overhead Cranes • Hoists • Arc Welders and Electrodes • Soil Stabilizer • Crawler and Truck Cranes • Diesel Engines • Cane Loaders • Pre-assembled Houses

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PAGE Stainless Steel WELDING ELECTRODES

Armor Welding Electrodes
. . . and All Standard Types

AC or DC . . . the ***BEST***
. . . for any weld
on all types
of stainless steel

STAINLESS STEEL
has great strength . . . but its strength is limited by the quality of welds which seal the joints. In all kinds of manufacturing—military work in particular—stainless is being used more widely. If you weld stainless, choose electrodes with care.

PAGE STAINLESS STEEL ELECTRODES, AC or DC, give a stable arc under all conditions. The metal flows smoothly. Slag is clean and easily removed. The coating resists cracking down to very short stubs. Now available in 10-lb. lined, hermetically sealed metal cans which can be reclosed. ***Be sure . . . specify Page Stainless Steel Electrodes.***

ACCO
Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

PAGE WELDING ELECTRODES

FRANK G. JONES has been appointed sales manager of the Gasweld and Welding Supply Division of The Liquid Carbonic Corporation, Chicago. He has been in the welding supply field for more than 16 years and with Liquid Carbonic since 1948.

* * *

JOHN FOX, formerly district manager for Machinery and Welder Corporation, has been named representative of the A. O. Smith Welding Products Division in the greater St. Louis area.

* * *

HERBERT B. CLARK was elected a director of Fansteel Metallurgical Corporation recently. JOHN MEADE has joined Fansteel's administrative staff as director of industrial relations.

* * *

DR. EDWIN WETTERSTROM has joined the research and development staff of Graver Tank & Mfg. Co., Inc., Chicago as analytical engineer. He has had much experience in the design of pressure vessels and steel structures, formerly holding the post of project engineer in charge of analysis for the pressure vessel research committee of the Welding Research Council.

* * *

ROSS M. BURTHWICK has returned to Williams & Co., Inc., Columbus, O., having completed special duty early this year with the Canadian Navy.

* * *

FRANK E. (BUD) KESSLER, former sales manager of Welding Equipment and Supply Co., Detroit, is retiring from welding to become general manager of Chief Industries, Chief, Mich., manufacturers of wood products. PAT S. DOYEN, field engineer, will assume Mr. Kessler's duties as sales manager and will be in charge of distributor sales.

* * *

JOHN WIEHE and WALTER WENZEL have been named heads of a plant engineering and planning department at Allis-Chalmers, Norwood, O., Works.

* * *

BRUCE A. DEAN, formerly general sales manager of The Mengel Company, Inc., Louisville, Ky., has been elected vice-president in charge of sales of Chase Brass & Copper Co.

* * *

ROY A. HUNT, president of Aluminum Company of America, since 1928, was named chairman of the executive committee recently. I. W. Wilson, senior vice-president, was elected president in his place.

WELDERS' CLOTHING

Job-Proved
AO WELDERS' CLOTHING
Pays Off in
PROTECTION,
COMFORT,
SERVICE!

AO 208 BCL CAPE SLEEVE with DETACHABLE BIB made of select chrome-tanned cowhide, protects arms, chest and shoulders without bulkiness. Double cotton stitching and steel sewing of all seams is typical of AO's quality and thoroughness. Seam ends reinforced with steel rivets. Steel fasteners attach bib to front of cape. Armpit anchor buttons keep cape in place without discomfort. 5 sizes: double extra large, extra large, large, medium, small.

Other AO chrome-tanned leather standouts in welders' clothing include the 207 CL OVERALL with large one-piece bib, double stitched and steel-sewed seams, 10 standard waist sizes . . . the 206 CL COAT with turn-up collar and snap fastener cuff adjustment for snug fit; five sizes . . . long-wearing 205 CL PANTS in 10 sizes ... the 209 CL SLEEVE which provides comfortable protection for the arms. Your nearest AO Safety Products Representative can supply you.

NO UNNECESSARY SEAMS

Welders' leathers wear most at the seams. That's why AO Welders' Clothing is made without seams where possible. When seams *are* needed, they are double cotton-stitched, reinforced with steel stitching, and usually distant from line of fire hazard. For added comfort, sleeves and cape sleeves feature *flat* sleeves which also cut down elbow wear.

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

An Unbeatable Combination!

SILVALOY SILVER BRAZING ALLOYS

The Silvaloy group consists of 7 popular silver brazing alloys high in tensile strength and producing strong, ductile joints on ferrous and non-ferrous metals.

	SILVER CONTENT	MELTING POINT	FLOW POINT
SILVALOY 50	50%	1160 F	1175 F
SILVALOY 45	45%	1125 F	1145 F
SILVALOY 40	40%	1135 F	1205 F
SILVALOY 35	35%	1125 F	1295 F
SILVALOY 20	20%	1430 F	1500 F
SILVALOY 15	15%	1185 F	1280 F
SILVALOY 503	50%	1195 F	1270 F

1200 All-Purpose Flux—for use on all metals. No. 1200 Flux readily dissolves oxides during brazing operations and aids in the flowing of the alloy. Meets all government specifications.

1100 Low Temperature Flux—superior where exceptionally clean surfaces on copper or copper alloys are required at lower temperatures.

COMPLETE STOCKS

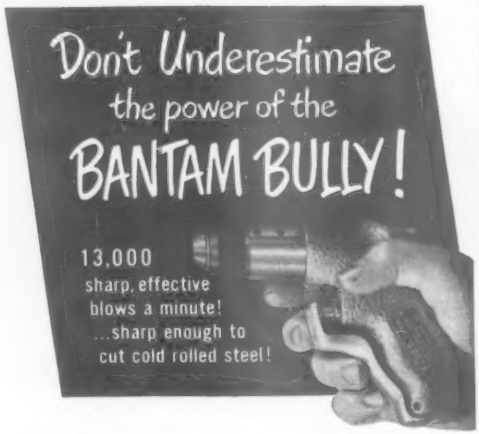
Oxy-acetelyne welding rods and flux for cast iron, steel, aluminum, brass, copper, bronze, nickel, monel and inconel.

STEEL SALES
CORPORATION

3348 SOUTH PULASKI ROAD • CHICAGO, ILLINOIS

BRANCH PLANTS: Detroit, St. Louis • BRANCH OFFICES: Milwaukee, Minneapolis, Grand Rapids, Indianapolis, Kansas City, Mo.

Scales and cleans welded joints easily



The amazing Bantam Bully air hammer gives you real power in an easy-to-use size. It is 5" long and weighs only 22 ozs. Exclusive metering trigger regulates the power from a feather touch to a powerful blow. Full speed and power attained on less than 6½ C.F.M. of air.

Use it for scaling, chiseling, peening, tamping, cutting, routing, grooving, caulking, channeling, chipping, driving, drilling, marking, and hundreds of other applications.

Write for full details on the Bantam Bully, Big Bully, Bully blow gun and the Bully Fulflo air filter.

Superior Pneumatic division of **Herbrand Tools**

4758 WARNER ROAD • GARFIELD HEIGHTS, OHIO

RICHARD J. BROWN has been appointed advertising and sales promotion manager of the Delta Power Tool Division of the Rockwell Manufacturing Co., Milwaukee.

* * *

EDWARD L. RYERSON, chairman of the board, Inland Steel Company, Chicago was recently presented the Gary Memorial Medal for outstanding achievement in the iron and steel industry by the American Iron and Steel Institute.

* * *

BENJAMIN F. FAIRLESS, president of the United States Steel Corporation has been awarded the Bessemer Medal for 1951 by the British Iron and Steel Institute.

30 YEARS AGO

(From THE WELDING ENGINEER of July, 1921)

A RECENT technical paper on the relative merits of oxyacetylene welding and cutting torches as investigated by R. S. Johnston, engineer-physicist for the Bureau of Standards, indicated that no single make of torch works for all thicknesses of metal. It also indicated that the best ratio of gases was one to one, but that no torch tested kept this ratio during welding.

— 30 YEARS AGO —

WRITING for trade magazines is a 50-50 proposition, suggests Editor L. B. Mackenzie. If readers would send information in to be passed on in trade for the knowledge they receive from the magazine, the whole industry would benefit.

— 30 YEARS AGO —

THE old Rush Street Bridge in Chicago was recently flame cut into scrap size sections. The 240 by 20 ft bridge was bought for $500 to salvage the 250 tons of scrap in it.

— 30 YEARS AGO —

ALL-WELDED tubular steel and sheet buildings are gaining popularity in the Southwest. The patented design for one type was developed by W. D. Clay, president of the Clay Boiler and Machine Co., Ranger, Texas.

— 30 YEARS AGO —

BURNING out oil and tar from box cars is the latest task for the oxyacetylene torch in Minneapolis. Reason is that the boxcars are condemned for the carrying of flour until they are free of such substances. It's supposed to be saving both the millers and the railroads thousands of dollars annually.

Save Top Carrier ROLLS

with

STOODY 1027

Don't throw top carrier rolls away! They're too hard to get these days. When the tractor is down for repairs to track, sprockets, idlers or rollers—rebuild top rolls with Stoody 1027.

Stoody 1027 gives longer service, resists the wearing of flat spots when rolls freeze up with mud. Rolls should be rebuilt before too serious wear occurs.

See your Stoody dealer . . . or write for folder on welding procedure for top carrier rolls.

STOODY COMPANY

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HELP OUR NAVY GET SUBMARINES!
YOU SAVE STEEL...
When You INCREASE the LIFE of YOUR EQUIPMENT with . . .
AC.
DC
SEACO
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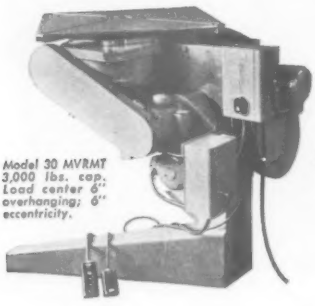
MARK
Hard-Surfacing
WELDING ELECTRODES
1. A SINGLE PASS of SEACO allows Hammermill Hammers, Crusher Mantles, Bucket Teeth and Bucket Lips to work-harden and last longer.
2. REPAIRS made with MANGANAL and protected with SEACO outlast new parts.
3. SEACO resists severe impact and abrasion . . . is never softened by dilution from parent metal.
4. AVAILABLE in 1/4" and 3/16" diameter, standard lengths, 12".
Write TODAY for FREE Literature . . . Outlines Newest Methods of Economical Repairs.
NAME OF NEAREST DISTRIBUTOR UPON REQUEST
STULZ-SICKLES CO.
SOLE PRODUCERS
92 N. J. Railroad Ave.
Newark-5, New Jersey

now...ALL awkward position welding made easy with

WELDMORE
The POS-I-TIONER
with Production in Mind



Model 30 MVRMT 3,000 lbs. cap. Load center 6" overhanging; 6" eccentricity.

Check These Advantages—

- All gearing precision machine cut for minimum back lash. Smooth operation both on rotating and tilting. Impact loading minimized for safety.
- Variable power table rotation — with variable table elevation changes.
- Push button hand control; 135° table tilt with safety limit stops.
- All steel construction.

Send for complete specifications on this and other models, having capacities of 7,500; 18,000; and 25,000 lbs.

PANDJIRIS WELDMENT CO.
5151 NORTHRUP — ST. LOUIS 10, MO.

WELDING GANTRIES—WALL TRACK PLANOGRAPH WELD ARMS—TURNING ROLLS—TANK JIGS—TUBE BENDERS—HYDRAULIC COIL MANDRELS—SPECIAL POWER WELD TOOLS

Book Reviews

Welder Controls

ELECTRONIC MOTOR AND WELDER CONTROLS. By George M. Chute. Published by McGraw-Hill Publishing Co., New York, 1951. Cloth, 6 x 9 in., 348 pages. Price $6.50.

The author of this volume discusses a difficult subject in two parts: first, resistance welding controls and second, motor controls. The welding reader will be primarily interested in the first half of the book, perhaps, though the entire book has considerable value to the electrical engineer dealing with control problems.

For the man who has to select, install or maintain electronic controls on welders, this book offers practical assistance for better job performance. Chapters have been devoted to such subjects as basic welding controls; sequence weld timers; high speed, high combination synchronous timers; synchronous combination slope control, temper welding and forge timing, seam welding controls, welding with limited power supply and three phase welding controls.

Detailed information and explanations of the circuits of tube-operated welder controls is provided. Each chapter opens with an introduction to a complete electronic equipment and timer that is split into its component circuits for individual treatment. Each operation is explained through simple descriptions and clearly drawn diagrams. When the author describes the more complex circuits, he assumes the reader knows something about simpler electronic controls. If you're short on this, however, there are frequent references to background material.

* * *

Drafting

PROBLEMS IN ENGINEERING DRAWING. Third Edition. By W. J. Luzadder, J. N. Arnold and F. H. Thompson. Published by Prentice-Hall, New York, 1950. Loose leaf, 8½ x 11 in., 78 pages. Price $4.35.

Here are presented 71 work sheets of exercises in lettering, the use of drawing instruments, geometric construction, multi-view drawings and sketches, auxiliary views, sectional views, dimensioning, screw threads and fasteners, working drawings, assembly drawing, pictorial drawing, intersections and developments.

Most of the work sheets are practical layouts that present much instruction in a short time. The problem sheets also provide an excellent means for home study of engineering drawing.

GET THIS
New FREE
Bulletin

cam-lok

the new, rugged
trouble-free
CABLE
CONNECTOR
and ELECTRODE
HOLDER for
better low cost welding

Greater pressure contact that really minimizes high resistance and cable heating.

Rugged, light weight holder for welding in "hard to get to" corners—no electrode bending necessary.

Mail this convenient coupon today.

cam-lok Division of Empire Products Inc.
P. O. Box 98-B Cincinnati 36, Ohio

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Company_____
Address_____
City_____ Zone____ State____
Dealer's Name_____

Inspection

INDUSTRIAL INSPECTION METHODS, Revised Edition. By Leno C. Michelon. Published by Harper & Bros., Inc., New York, 1950. Cloth, 6 x 9 in., 566 pages. Price $6.

This new volume dealing with industrial inspection methods has been completely revised and greatly expanded over the previous edition. The contents are presented in six sections, namely: (1) basic concepts (2) dimensional control (3) testing for physical and mechanical properties (4) superficial inspection methods (5) inspection organization and personnel (6) appendix.

Welding men will be particularly interested in sections 3 and 4. They deal with mechanical properties and destructive testing, hardness testing, magnetic particle inspection, nonmagnetic methods of testing, industrial radiography and surface inspection. The reader will learn about the latest techniques, standardizations and inspection devices.

An extremely useful appendix includes tables, a bibliography of inspection literature, a list of the important manufacturers of testing equipment (and their catalogs and technical bulletins) plus reference material on visual aids in connection with inspection methods.

* * *

Tool Engineering

TOOL ENGINEERING. By Lawrence E. Doyle. Published by Prentice-Hall, Inc., New York, 1951. Cloth, 5½ x 8½ in., 499 pages. Price $3.65.

This book does not only present the important procedures of tool engineering, but attempts to go behind the scenes to explain the reasons for the procedures. It is a demonstration of how tool engineering problems may be solved quickly by analytical methods based on engineering fundamentals. In doing this, the author does a good job of correlating the practical and theoretical aspects.

The book begins with the background of tool engineering and carries the reader through the economic considerations involved in it. Then, the requirements and conditions of tool processes are reviewed. Finally, the actual design is worked out. Two important chapters explain the principles of estimating and include valuable estimating shortcuts.

This book may be used as a college text or as a help to graduate engineers finding themselves faced with tooling problems. For those who have risen from the ranks, the book will give a valuable insight into engineering accounts of analysis and reasoning.

SPATTER
Doesn't
MATTER...
ON A HARGRAVE
WELDERS'
CLAMP

NO. 41 LIGHT SERVICE

NO. 45 DEEP REACH

NO. 43 HEAVY SERVICE

SPRING CLAMP
For spot welding and other light duty welding. Holds firmly, releases instantly. Useful where speed is needed. Every shop needs a few.

INDIVIDUALLY TESTED

Hargrave Nos. 41, 43 and 45 Welder's Clamps resist spatter permanently because the Patented screws are made of an anti-spatter, solid alloy material—not to be confused with ordinary plated types of screws. They speed your work . . . ease the job and give years of trouble-free service. Frames are forged steel, heat-treated and designed to give greatest strength for weight. Oscillating (ball and socket) tip is put on to stay. Each clamp is individually Tested. Openings in all popular sizes.

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showing the complete line of Hargrave Individually Tested Clamps, Chisels, Punches, Star Drills, Brace Wrenches, File Cleaners, Washer Cutters, etc.

There is an Industrial Distributor Stock near you.

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1944 Waverly Ave.
Cincinnati 12, Ohio
The Cincinnati Tool Co.

SPEED-UP The Job with this Handy CMD CHIPPING HAMMER

TYPE EB
Head of high-grade steel combines drift and chisel. Handle has removable wire brush

With this convenient CMD Chipping Hammer you can quickly chip slag free from any weld and brush it out of the way. It is one of many styles of strong light-weight perfectly balanced hammers, with wood or steel handles in the CMD line. Order from your dealer.

Use drift to peen slag in bead

Sweep out slag with wire brush

Write for FREE Booklet "How to Clean Welds"

16 pages packed with practical pointers helpful to experienced weldors as well as to apprentices. Write Dept. 7-W today for your copy.

CHICAGO MANUFACTURING & DISTRIBUTING CO.
1928 West 46th Street • Chicago 8, Ill.

SPATTER-EX COMPOUND

EFFECTIVE IN EITHER ARC, FLASH OR BUTT WELDING.

Prevents Bonding of Welded Spatter

to parts which are to be welded.

Easy to use—simply coat the surfaces which will be struck by spatter. A film is formed which prevents bonding. Spatter-Ex can be quickly washed off with water or metal cleaner solution. It reduces labor time and costs by eliminating chipping, grinding, steel brushing and other cleaning operations required ordinarily to remove spatter.

Another time and cost saver

FLASH-EX COMPOUND

Widely used in preventing flash adhesion and in preventing bonding in resistance welding.

Write for samples or send trial order

WAYNE CHEMICAL PRODUCTS CO.
Metal-Working Oils & Compounds
9800 Copeland, Detroit 17, Mich.

TILLMAN

GLOVES • GARMENTS

BRAZILIAN DEERSKIN
Gloves and Mittens

The stay soft leather

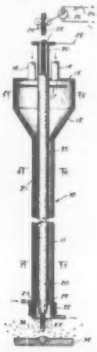
ask your DEALER for

TILLMAN PRODUCTS
JOHN TILLMAN & CO.
LONG BEACH, CALIF.

From the Patent Office

Inert-Gas Shielded Welding

2,544,711. GEORGE MIKHALAPOV, Far Hills, N. J. Assigned to Air Reduction Co., Inc., New York City. Filed March 26, 1949. Granted March 13, 1951.



Patent refers to an apparatus for arc welding that includes a tube through an electrode is advanced toward the arc. A housing having a lower portion with an outlet surrounds the parts of the electrode immediately back from the arc end of the electrode. This discharges an uninterrupted annular curtain of gas downward around the region of the arc and across the surface of the weld. An enlarged gas chamber at one end of the housing has a transverse cross section several times larger than the cross section of the annular curtain. An inlet conduit supplies gas to the chamber. A baffle is located in the upstream portion of the chamber immediately downstream from the inlet conduit to spread the gas stream from the conduit outward across the chamber. This decreases the rate of movement of the gas in the chamber downstream of the baffle. The housing has a passage of uniform cross-section.

• • •

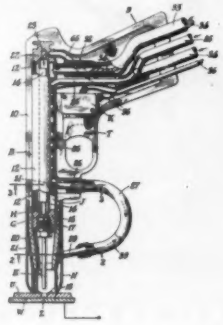
Coated Welding Rod

2,544,000. RENE D. WASSERMAN, Stamford, Conn. Filed May 5, 1949. Granted March 6, 1951.

Patent covers a flux coated welding rod bearing a continuous external metallic film having an average thickness between about one and about twenty one-thousandths of an inch.

Inert Arc Spot Welding

2,550,495. FRANK J. PILIA, Springfield, N. J. Assigned by mesne assignments to Union Carbide and Carbon Corp. Filed Feb. 28, 1947. Granted April 24, 1951.



Patent pertains to a device for arc welding metal workpieces. It includes a holder for directing an electrode toward the metal and a mechanism for advancing a nozzle into contact with the metal to surround an area concentric with the electrode. The nozzle spaces the electrode from the metal. There is a valve for turning on a supply of gas to the nozzle to fill the space between the electrode and the nozzle area. A timer is interconnected with the valve for turning on the welding current. At a predetermined time after the gas supply has been turned on, a welding arc is struck between the electrode and the workpiece. The weld is made under completely shielded conditions so it remains clean and strong.

* * *

Arc Welding Control

2,540,838. HENRY W. SNYDER, West Allis, Wis. Assigned to Allis-Chalmers Mfg. Co., Milwaukee. Filed March 29, 1946. Granted Feb. 6, 1951.

Newly patented welding control is for a transformer welder that has a normal open circuit voltage of dangerously high value. The secondary includes an impedance. Control includes a switch for connecting the primary with the current source and transformer means connecting the secondary with the current source for impressing on the secondary winding a voltage of safe value below the normal open circuit voltage. There are also means responsive to the voltage drop in the impedance operable upon short circuiting of the welding circuit. This disconnects the secondary winding from the transformer means and causes closure of the switch.

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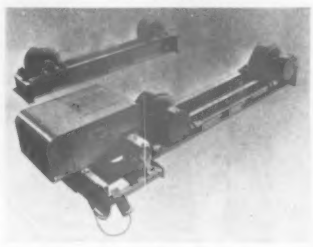
NEW PRODUCTS

(Continued from page 47)



Improved Turning Rolls Carry 75 Tons

YEARS of development and research have gone into the new 75PR Worthington turning roll for welding pressure vessels, tanks and drums. The load is distributed over three units, a power roll and the two idler rolls. With six steel rollers, the turning capacity is 150 tons (five idlers). The outboard roller is adjustable to various center-to-center distances to accommodate various sizes of tanks. Stops are placed on the frame itself to locate the roller and prevent the sliding of bearings. Drive shafts are connected by chain-type flexible couplings that are self-aligning.

Profile of the rolls has been kept to a minimum with the drive being lower than the rolls for easier load handling. For automatic welding, rubber-covered rolls can be furnished.

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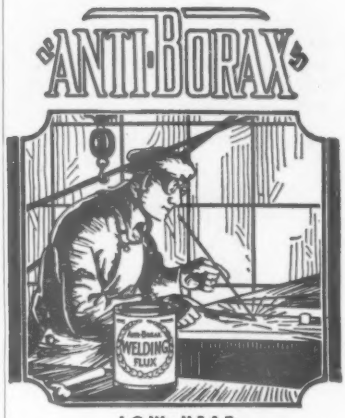

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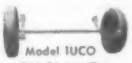

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LINDE AIR PRODUCTS CO., 30 East 42nd St., New York City 17.

* * *

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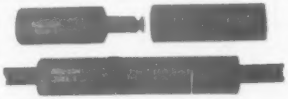

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* * *

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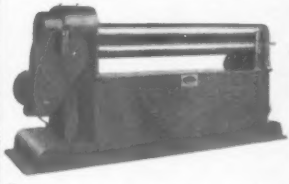

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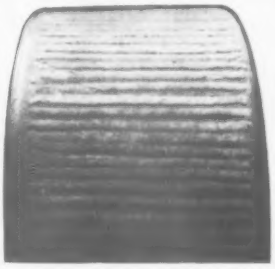

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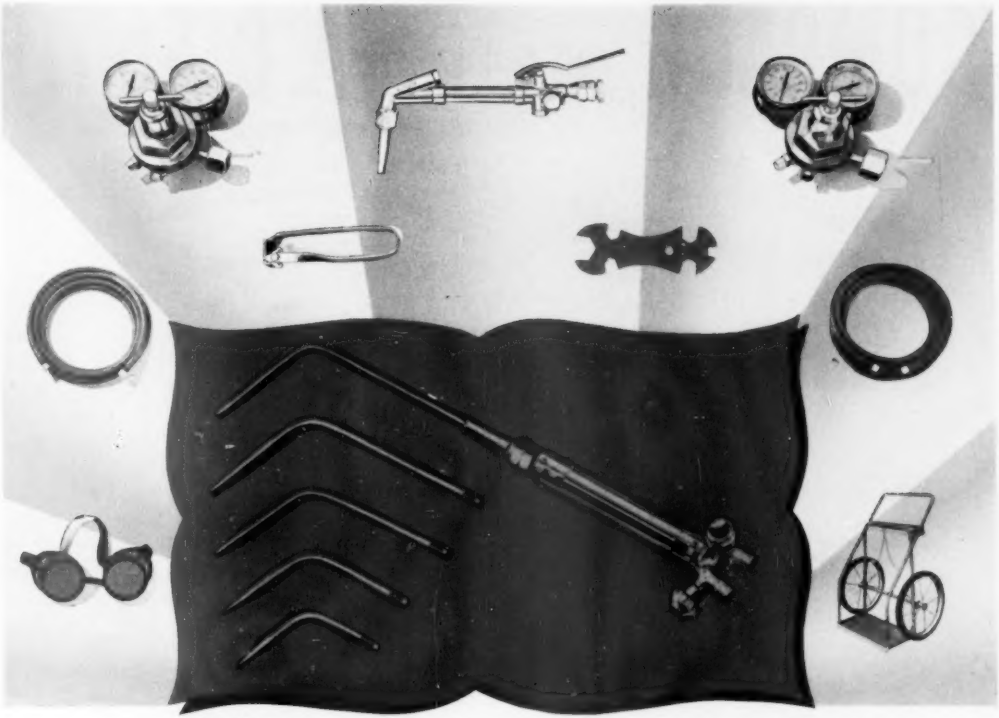

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